REPORT ON THE SOIL INVESTIGATION AND STUDY CONDUCTED AT THE NEW SERVICE ROAD AREA OF THE BURBANK-GLENDALE-PASADENA AIRPORT AUTHORITY

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Presented to:

Burbank-Glendale-Pasadena

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Volume I - Main Report

The findings and recommendations in this report were prepared in accordance with the generally accepted norm of professional engineering and geologic practice. We make no other warranty, either expressed or implied.

The recommendations are based on our present knowledge of the subsurface conditions of the general area, and the extrapolation of lithologic units between and beyond boring locations, the evaluation of the analytical tests results, the review of available data and information gathered during the course of this study. Changes in the recommendations may be necessary during the site implementation of the remedial alternative as dictated by the actual field conditions.

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TABLE OF CONTENTS

VOLUME - I	Page N	٧o.
1.0	INTRODUCTION 1	
2.0	OBJECTIVE AND SCOPE OF STUDY 1	
3.0	SITE LOCATION AND DESCRIPTION 2	
4.0	GEOLOGY 4.1 Regional Geologic Setting	
5.0	PREVIOUS SITE INVESTIGATION 5.1 Lockheed's Studies	
6.0	SOIL GAS SURVEY 6.1 Number and Sampling Points 7 6.2 Field Sampling Procedures 8 6.3 Laboratory Procedures 8 6.4 QA/QC Laboratory Analyses 9	
7.0	SOIL BORING AND SAMPLING 7.1 Location and Number of Borings 10 7.2 Drilling Procedures and Methodology 10 7.3 Vapor Monitoring 12 7.4 Lithologic Logging 12 7.5 Decontamination 12 7.6 Abandonment of Boreholes 12 7.7 Disposal of Cuttings 12	
8.0	LABORATORY ANALYSIS OF SOIL SAMPLES 8.1 Summary of Sampling/Testing Schedules 13 8.2 Quality Assurance/Quality Control Program 15	
9.0	DISCUSSION AND INTERPRETATION OF RESULTS 9.1 Results of the Soil Gas Survey	
10.0	CONCLUSION AND RECOMMENDATION 10.1 Summary of Geologic Findings	
11.0	REFERENCES	

LIST OF TABLES

	Table 1: Table 2: Table 3: Table 4: Table 5: Table 6: Table 7: Table 8: Table 9: Table 10: Table 11: Table 12:	Results of Analysis (Gregg and Associates, Inc.) Results of Analysis (McLaren-Hart) Results of Analysis (ALB) Soil boring Data Sampling and Analytical Tests Schedule Analyte Concentrations By GC/FID, (ug/l) Analyte Concentration By GC/ECD, (ug/l) Results of Analysis, TRPH Results of Analysis, Aromatic Volatile Organics Results of Analysis, Halogenated Volatile Organics Analytical Results, CAM metals, (mg/kg) CAM Metals Limits and Natural Concentration Ranges
LIST OF	FIGURES	
	Figure 1: Figure 2: Figure 3: Figure 4:	Airport Plan Soil Borings Where Petroleum Hydrocarbons Were Detected Geologic Cross Section A-A' Geologic Cross Section B-B'
LIST OF	APPENDICES	•
	Appendix 1: Appendix 2:	Health and Safety Plan/Emergency Action Plan Soil Gas Survey, Burbank-Glendale-Pasadena Airport Burbank, California, Report Prepared by Target Environmental Services, Inc.
	Appendix 3:	Quality Assurance Project Plan for Soil Gas Sampling Under Mobile Conditions, Prepared by Target Environmental Services, Inc.
	Appendix 4:	ALB's Field Procedure and Measurements
	Appendix 5:	Boring Logs
	Appendix 6:	QA/QC Program

VOLUME - II

Results of Analytical Tests Conducted by Curtis and Tompkins Analytical Laboratories, Inc.

REPORT ON THE SOIL INVESTIGATION AND STUDY CONDUCTED AT THE NEW SERVICE ROAD AREA OF THE BURBANK-GLENDALE-PASADENA AIRPORT AUTHORITY

1.0 INTRODUCTION

This report presents the results of the soil gas survey and the confirmatory soil borings and sampling conducted in an area where a new service road of the Burbank-Glendale-Pasadena Airport Authority (Airport Authority) was recently constructed.

The area, located south of Lockheed Aeronautical System Company (Lockheed) Plant C-1, was formerly leased from the Airport Authority and used for Lockheed operations. As part of the expansion project of the Airport Authority, it reassumed possession of the property and is negotiating for the purchase of Lockheed Plant C-1.

Because of certain environmental concerns which may be associated with Lockheed operations, the Airport Authority had undertaken soil investigations for environmental site assessment in order to determine whether the subsoils in the area had been impacted/contaminated as the results of Lockheed's activities. Two concrete wash-down containment pads were used by Lockheed for its drum and equipment washing activities. Two (2) sumps were provided to collect and transport waste water.

The confirmatory boring was conducted by West Hazmat Drilling Corporation (West Hazmat) on November 14-15, 1991. Target Environmental Services, Inc. (Target) performed the soil gas survey on September 11-12, 1991. Both firms subcontracted the work with A. L. Burke Engineers, Inc. (ALB), consultant-advisor to the Airport Authority.

The evaluation of the soil contaminations was based on the results of these studies as well as the previous investigation conducted in the area both by the Airport Authority and Lockheed.

2.0 OBJECTIVE AND SCOPE OF STUDY

The present study is part of the environmental assessment of the property previously leased to Lockheed. The primary objective of this study is to confirm the contaminations that had been detected in the previous soil investigation and to assess whether such contaminations are related to the previous operations of Lockheed.

In order to meet this objective, the study was comprised of soil gas survey, soil boring and sampling, analytical tests of soil samples, review of the previous investigation, assessment of the subsoils characteristics and conditions, evaluation of the impact of contaminations and environmental recommendations. Specifically, the various tasks which were performed to complete the environmental site assessment are summarized as follows:

- Health and Safety Plan/Emergency Action Plan was prepared and discussed with the Field Personnel. All personnel read, understood and agreed to comply with its provisions before fieldwork began. Safety procedures were strictly enforced by the Field Geologist. A copy of the Plan is included as Appendix 1.
- Soil gas survey was conducted and 49 vapor samples were collected from 22 location points.
 Analyses of the samples were done on-site by the use of mobile laboratory. Details are discussed in Section 6.0.
- Results of previous investigation were reviewed and incorporated in the present report. Results of analyses of soil samples are shown in Tables 1 and 2.
- Five (5) confirmatory borings were drilled in locations where previous sampling indicated significant level of concentration of certain compounds. The depth of the boring is 80 feet. The soil boring data are summarized in Table 4 while the details of the field investigation are discussed in Section 7.0.
- Soil samples and drill cuttings were examined on-site by the Field Geologist in accordance
 with the Unified Soil Classification System (USCS). A boring log was prepared for each hole,
 incorporating the lithological description and type of the subsoils, graphical log, the Standard
 Penetration Test (SPT) data as well as the OVA or TLV measurements.
- Soil samples were analyzed in accordance with the Sampling and Analytical Tests Schedule (Table 5). Soil samples were analyzed for volatile organics, volatile aromatics, CAM metals and fuel hydrocarbon. The results of the analytical tests and the chain-of-custody documentation were compiled in separate volume (Volume II-Results of Analytical Tests).
- The findings, conclusion and recommendations were based on the evaluation of the field and analytical tests data.

3.0 SITE LOCATION AND DESCRIPTION

The area which was formerly leased to Lockheed is located north of the east-west Runway 8-26 and south of Lockheed Plant C-1. Figure 1, Airport Plan, shows the location of the site.

The present service road is paved by new asphalt surfacing. While most of the old asphalt pavement was removed and replaced by new one, a small portion of the old asphalt and the old concrete wash downs built by Lockheed were not demolished and remain in the area. The concrete wash containment pads are located adjacent and northeast of the service road. The concrete surface and the old asphalt shows oil stainings. Sludges/residues were observed in the drains.

Prior to the construction of the service road, the old asphalt surfacing had shown evidences of deterioration, crackings and oil stainings. In one of the excavation for the cable line during construction, the soil exhibited faint petroleum odor.

4.0 GEOLOGY

The discussion on the geologic conditions was based on the information from the references cited (Ref. 1, 2 and 6) and from previous soil borings drilled at the different areas within the airport.

4.1 Regional Geologic Setting

The Airport Authority property lies on the eastern side of the San Fernando Valley. The valley is an intercoastal basin bounded by the Santa Susana Mountains to the northwest, the San Gabriel and Verdugo Mountains to the north and northeast, the San Rafael Hills to the east, the Santa Monica Mountains to the south, and the Simi Hills to the west. The valley slopes south-southeast toward the Los Angeles River.

The Basin is composed of alluvial deposits derived from the surrounding mountains and hills. The alluvial deposits consist primarily of fine-grained sediments on the western side of the valley. The eastern side of the valley is underlain by coarse grained deposits. Due to high permeability of the alluvial deposits on the eastern side of the valley, this area stores much of the ground water contained within the basin. The depth to ground water throughout the valley varies between 50 and 300 feet with deeper levels found near the center of the valley and near areas of pumpage. The regional ground water gradient dips in a south-southeasterly direction. In the vicinity of the Airport Authority and the Lockheed facilities, the depth to the ground water is expected to be within 200 to 230 feet.

4.2 Site Geology

The new service road area is underlain by fine to coarse sands with varying amounts of silts and gravels immediately after the 2-3 inch of asphalt paving. The subsoils range from poorly graded (SP) to well graded (SW), medium dense to very dense materials. Minor lenses of non-plastic to slightly plastic silts (ML) interbed with the SP/SW units. Because the fines occur as thin and discontinuous lenses, the vertical migration of the contaminants are not restricted. The 3 types of subsoil materials were found to intertongue with each unit. This condition may be related to the process and the prevailing environment during deposition.

Cobbly to bouldery layers (GP/GW) were encountered at depth 75 feet and 80 feet. In other facilities within the airport, the cobbly to bouldery units were found at 70 feet.

Figures 2 and 3 show the vertical disposition of the different soil types as extrapolated from the borings.

5.0 PREVIOUS SITE INVESTIGATION

Lockheed had performed environmental site assessment on its properties which the Airport Authority are planning to purchase. The property where the Airport Authority is initially interested is the Lockheed Plant C-1. Site investigation was conducted by Lockheed in Plant C-1 including the area which was previously leased from the Airport Authority. The Airport Authority also performed preliminary environmental assessment in the leased area. In both studies by Lockheed and the Airport Authority, the subsoils quality in the leased area had been impacted by certain levels of contaminations

Results of these investigation as they pertain to the leased area are discussed in the following sub-section.

5.1 Lockheed's Studies

Gregg and Associates, Inc. and McLaren-Hart Environmental Co. were contracted by Lockheed to undertake environmental studies in its Plant C-1 facilities. Shallow borings were undertaken at the different facilities including the leased area. The maximum depth of the borings in the leased area was 20 feet. The findings from these borings in the leased area which show some levels of contaminations are shown in Tables 1 and 2.

As can be noted in Tables 1 and 2, the trend of contamination was decreasing at depth where the high concentration values of TPH and some of the aromatics were confined within the upper 5 feet. In one boring (SB-16), 3468 mg/kg TPH was found at 14 feet.

Table 1: Results of Analysis (Grego and Associates, Inc.)

Depth (feet)	Concentration, TPH (mg/kg)
2.5	1000
5	2
10	7
2.5	140
5	3
10	40
15	<1
20	<1
2.5	20
5	2
10	<1
15	6
20	<1
2.5	500
5	4
10	4
2.5	1400
5	14
10	4
2.5	240
5	2
10	<1
15	<1
20	1
	2.5 5 10 2.5 5 10 15 20 2.5 5 10 2.5 5 10 2.5 5 10 2.5 5 10

Continued

Boring No.	Depth (feet)	Concentration, TPH (mg/kg)
B33	2.5 5 10 15 20	480 <1 3 <1 <1

Note: TPH - total petroleum hydrocarbon (EPA 418.1) Ref. 3

Table 2: Results of Analysis (McLaren-Hart)

Borings Numbers	Depth (feet)	Toluene (ug/kg)	Concentration O-Xylene (ug/kg)	IPH (mg/kg)
SB-16	4	<2.5	<0.5	320
	9	<2.5	<0.5	<5
	14	<2.5	<0.5	3468
SB-49	1	56	1.2	6
	5	43	0.7	120
	10	<2.5	<0.5	5
SB-50	1	2.5	<0.5	<5
	5	3.2	<0.5	· <5
	10	<2.5	<0.5	54
S8-51	1	4.8	<0.5	14
	5	<2.5	<0.5	<5
	10	<2.5	<0.5	<5
SB-67	3.5	<2.5	<0.5	230
	8.5	<2.5	<0.5	<5
	13.5	<2.5	<0.5	<5

Note: TPH - total petroleum hydrocarbons (EPA 418.1) Ref. 4

5.2 Airport Authority Studies

In May 1990, the Airport Authority commissioned ALB to undertake an environmental site assessment of the area leased to Lockheed in order to determine whether the soil in this area had been impacted/contaminated as a result of Lockheed operations (Ref. 5).

The fieldwork, which was performed during the construction of the new service road consisted of shallow borings and sampling at 5 feet and soil gas survey undertaken by ABB Environmental Services, Inc. Boring and soil gas sampling points were located along the new service road.

The soil gas sampling points and boring locations where some level of contaminations had been detected are summarized as follows:

a) Soil Gas Sampling Results

From out of 47 sampling points, some degree of contamination was detected in soil gas samples collected from 3 points.

Sampling Point	<u>Depth</u>	Solvent Detected	Concentration (ppm)
. 1	4.5 feet	Halogenated Solvent	1.9
33	2.5	Toluene Halogenated Solvent	2.0 4.6
44	2.5	Halogenated Solvent	3.7

Halogenated Solvents detected in Sampling Points 1 and 44 may be related to overflow or spillage during the washing activities. Relative to the location of the wash-down concrete pads, Sampling Point 1 was at a depression approximately 11 feet south of the eastern edge of the east concrete pad while sampling point 44 was located within the west concrete wash pad. Oil stains were pervasive in this vicinity.

b) Results of Soil Sampling

Six (6) shallow borings by hand auger were performed along the new service road. Soil samples were collected at 1 foot and at 5 feet. Soil samples which showed total petroleum hydrocarbon by EPA 418.1 above detection limits are shown in Table 3:

Table 3: Results of Analysis (ALB)

Boring No.	Depth (feet)	Concentration, TPH (mg/kg)
HB-1	1	37
	5	60
HB-2	1	140
	5	10

Boring No.	Depth (feet)	Concentration, TPH (mg/kg)
нв-з	1 5	550 39
НВ-4	1 3 5	15000 880
HB-5	1 5	51 <10
HB-6	1 5	36 <10

Petroleum hydrocarbon is the major contaminant detected in all 6 soil samples collected at 1 foot and 5 feet. The highest concentration of 15,000 mg/kg was detected in shallow boring H-4, a few feet from the southeast corner of the smaller wash down concrete pad. While this contamination may be related to surface stainings (caused by overspill) due to petroleum-related wastes, contaminants had migrated downward to at least 5 feet as manifested in soil analysis of 880 mg/kg. Testing by EPA 8015 on some of the soil samples also indicated total fuel hydrocarbon (TFH) findings.

6.0 SOIL GAS SURVEY

A soil gas survey was conducted by Target Environmental Services, Inc. within an area of 110 by 200 feet south of Lockheed Plant C-1. Forty nine (49) vapor samples were collected from 22 location points. Thirteen (13) samples were obtained from 13 location points at depth of 6 feet (single depth). Thirty-six (36) samples were also collected from 9 location points at 4 sampling depths (multi-depth) of 6, 10, 15 and 20 feet. The detection of a solvent in a particular sampling location is representative of vapor, dissolved and/or liquid phase contamination at that location. The results of Target's survey are presented in its report (Appendix 2) dated October, 1991 and appended in this report as Appendix 2.

6.1 Number and Sampling Points

Figure 1 in Appendix 2 shows the location of the 22 sampling locations. A total of 49 samples were collected consisting of 13 single-depth samples (6 feet) from 13 locations and 36 multi-depth samples (6, 10, 15 and 20 feet) from 9 locations.

Certain considerations were used in determining the spacing and depth from where the samples were collected. These factors have been developed by Target through years of experience: purpose of the survey; source of contamination; subsurface condition, and size of site. The location of 40 to 50 feet distance between sampling points was a compromise between a reconnaissance-level sampling (50 to 100 feet) and a more definitive sampling (20 feet). Considering the site characteristics of silty fine sands and the absence of impermeable clay layers as well as a very deep ground water (200 feet), the distance of 40-50 feet between sampling points were adequate to meet the sampling objective. Multi-depth sampling was performed in certain locations where initial peaks or significant concentrations were detected at 6 feet. Samples were then collected at 10, 15 and 20 feet. This pattern provided the details to determine the nature, extent, and probable source (s) of contaminants detected at the site.

6.2 Field Sampling Procedures

ALB established the sampling grid pattern based on the considerations as discussed in Subsection 6.1. Since impermeable soil layers were not anticipated in the area, a 6-foot sampling depth was initially done. Presence of significant level of concentration necessitated the collection of samples at depth 10, 15 and 20 feet.

The sampling locations were marked on the ground by ALB field personnel. Each sample location was marked with a white circle and identified with a sampling point number. ALB also coordinated with the Utilities Services Alert (USA) in identifying the location of any product lines or other underground utilities or structures prior to the start of sampling.

Upon arrival at the site, Target field team checked the site map for accuracy. Sampling locations were measured and double-checked to known landmarks. Using an electrical and/or pipe detector probes, location of underground electrical cables and/or water pipes was reconfirmed.

In the collection of soil gas samples, Target utilized a van-mounted hydraulic probe to advance 3-foot sections of 1-inch diameter threaded steel casing down to the sampling depth. A hollow teflon line was inserted into the casing to the bottom of the hole, and the bottom-hole line perforations were isolated from the up-hole annulus by an inflatable (rubber) packer. A sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial. The self-sealing vial was detached from the sampling system, packaged, labeled and taken to Target on-site mobile laboratory for analysis.

For a multi-depth sampling, the shallow sample was collected first, and the probe was further advanced to collect the next sample in the same procedure as discussed.

Decontamination of all sampling equipment and probes were done prior to the start of the work. Field control samples were also collected as part of the field QA/QC.

6.3 Laboratory Procedures

The vapor samples were analyzed on-site using a gas chromatograph equipped with a flame-ionization detector (FID) for petroleum hydrocarbons and an electron-captive detector (ECD) for chlorinated hydrocarbon.

Analysis for chlorinated solvents was performed in accordance with EPA Method 601 (modified) but using direct injection instead of purge and trap. Specific analytes standardized for this analysis were:

1,1-dichloroethene (1,1-DCE)
methylene chloride (MC)
trans-1,2-dichloroethene (t-1,2-DCE)
1,1-dichloroethane (1,1-DCA)
cis-1,2-dichloroethene (c-1,2-DEC)
chloroform (CF)
1,1,1-trichloroethane (1,1,1-TCA)
carbon tetrachloride (CT)
trichloroethene (TCE)
1,1,2-trichloroethane (1,1,2-TCA)
tetrachloroethene (PCE)

Analysis for petroleum-based solvents was performed in line with EPA Method 602 on GC/FID, but using direct injection instead of purge and trap. The analytes standardized in this analysis were:

acetone
methyl tertiary butyl ether (MTBE)
methyl ethyl ketone (MEK)
benzene
toluene
chlorobenzene
ethylbenzene
meta- and para- xylene
ortho-xylene

6.4 QA/QC Laboratory Analyses

Quality Assurance/Quality Control procedures as contained in Target's Quality Assurance Project Plan for Soil Sampling Under Mobile laboratory Conditions (Appendix 3) were strictly followed throughout the analysis phase, summarized as follows:

- Calibration of the analytical equipment was performed using a three point instrument-response curve before the start of the work. Calibration was also done when analyte retention times drift enough to prevent analyte identification.
- The retention time of the standard compounds were used to identify the unknown compounds in the field samples. To ensure the validity of the compound identifications, periodic injections of key qualitative standards were performed daily prior to sample batch analysis and at additional intervals during analysis as necessary.
- Duplicate analyses were run for every tenth (10th) field sample.
- Laboratory blanks of nitrogen gas (99.999%) were analyzed prior to sample batch analysis and after every tenth (10th) field sample.

- All chromatograms were interpreted by qualified professionals.
- Following the project or job analysis phase, all samples were archived for a period of at least ten (10) days to allow for further analysis.
- Accuracy and precision with regards to data quality were documented in reports with the results of QA/QC procedures.

7.0 SOIL BORING AND SAMPLING

Confirmatory soil borings and sampling were conducted in order to reconfirm the significant levels of contamination that were detected in the soil gas survey as well as the results of analytical tests of soil samples collected in previous soil investigation. Since the deepest borings previously drilled reached 20 feet only, the present boring target was 80 feet. This will enable the determination of the extent of contamination and probably assess its possible impact on the ground water system in the area.

7.1 Location and Number of Borings

Five (5) borings were drilled at various locations where significant levels of contamination and peaks of certain analytes were identified from the soil gas survey. Since these peaks conform in general with the findings from previous borings, the confirmatory borings were sited adjacent to previous borings.

Table 3 shows the list of boring data. The location of these borings are shown in Figure 2.

Table 4: Soil Boring Data

Location	Drilling Period	Depth (Feet)
Near Sump	Nov. 14, 1991	80
Adjacent to SB-50 & HB-4	Nov. 14, 1991	80
Wash down concrete pad	Nov. 15, 1991	80
South of concrete pad	Nov. 14, 1991	80
Adjacent to SB-49	Nov. 15, 1991	80
	Near Sump Adjacent to SB-50 & HB-4 Wash down concrete pad South of concrete pad	Near Sump Adjacent to SB-50 & HB-4 Wash down concrete pad Nov. 14, 1991 Nov. 14, 1991 Nov. 15, 1991 Nov. 14, 1991

7.2 Drilling Procedures and Methodology

Drilling of all borings were undertaken by West Hazmat under the direction of ALB. The soil boring was started on November 14, 1991 and completed on November 15, 1991.

7.2.1 Soil Boring Protocols

The field procedure and methodology were in accordance with the attached Appendix 4, Field Procedures and Measurements, prepared by ALB. This site investigation approach was based on the requirements and protocols by the California Regional Water Quality Control Board - Los Angeles Region (CRWQCB-LA) and other regulatory agencies.

West Hazmat employed a Hollow-Stem Auger drilling using truck-mounted CME 75 drill rig with a capacity of 200 feet. Stem augers used were the 5-foot section auger with an inside and flighting diameters of 4-1/4 and 7-5/8 inches, respectively. The outside diameter was measured from the tip of the drilling auger flights which are welded onto the augers. The auger sections were joined together by pin connectors. The borehole was advanced through a pilot bit assembly coupled to the center rod which rotated together with the augers. Both the bit and the auger flights cut into the subsoils as they rotated and mechanically pressed downward. In the process, the drill cuttings were carried upward to the surface by the auger flights. The cuttings were stored in a 55-gallon DOT drum. No drilling muds or any other fluids were used in the drilling operations.

7.2.2 Soil Sampling and Standard Penetration Tests (SPT)

In conjunction with the drilling operations, SPT was also undertaken in collecting soil samples at 5-foot interval. The hollow-flight auger allowed the insertion of a 2-1/2-inch diameter, 18-inch long, split-type soil sampler. Three-piece brass tubes (2-1/2 inches diameter, 6 inches long) were placed inside the sampler where soil samples were collected. The split-spoon sampler (with brass tubes) was driven into the subsoils by dropping a 40-pound slide hammer, 30 inches high. The number of blows (NB) to effect every 6 inches penetration (for a total of 18 inches) was recorded. SPT was terminated after 18-inch penetration or after recording 50 blows without effecting a 6-inch penetration. The SPTs reflect the relative densities of the subsoils. The NB per 6-inch penetration is indicated on the boring logs.

Following retrieval from the boreholes, the brass tubes containing the soil samples were removed from the split-spoon sampler. The middle brass tube, with soil sample intended for laboratory analysis, was first segregated from the upper and lower tubes. The soils or rock chips protruding from the ends of the tube were trimmed with a pocket knife, which was (duly decontaminated between uses). Both ends of the brass tube were covered with a piece of teflon and then capped with plastic covers. The sample was labeled with sample number and depth taken. The tube was then placed inside a ziploc plastic and stored in a cooler containing blue ice for shipment to the laboratory after each working day. A chain-of-custody form entry was prepared for each sample batch and together with the samples, were picked-up by a representative-technician of Curtis and Tompkins, Ltd., a Department of Health Services (DOHS)-certified laboratory.

The upper most and the lowermost brass tubes were also removed from the split-spoon sampler. The soil sample in the upper tube was tested for OVA measurements. The soil sample from the lower brass tube was removed and spread on a plastic sheet. The Field Geologist then examined and logged the soil materials. (The description of the subsoils is shown on the boring log). After logging, the materials were disposed/stored in the 55-gallon DOT drums. The split-spoon sampler and the brass tubes were then cleaned and decontaminated using trisodium phosphate detergent (TSP). The sampler was then rinsed with distilled water for the next sampling round.

7.3 Vapor Monitoring

Organic vapor emission from each of the sample was monitored by the use of a thermoluminescent vapor meter (Model TLV Sniffer United Technologies Bacharach Portable Gas Detector Alarm System Catalog #0023-7356). The probe was inserted into the ziploc containing the soil samples and readings were noted on the read-out of the meter. The OVA measurements were indicated on the boring logs. Significant OVA reading of more than 50 ppm were recorded in only one boring, SCB-1, drilled adjacent to the sump.

7.4 Lithologic Logging

The soil samples were examined by the Field Geologist and described in accordance with the United Soil Classification System (USCS). In addition, other geologic characteristics and description, such as structure, minerals, relative densities, plasticity, etc. were also observed. Any peculiar odor or color of the subsoil were noted and indicated on the boring logs. The descriptive and graphical logs of each boring are attached as Appendix 5.

7.5 Decontamination

Decontamination of the hollow-stem augers and other sampling equipment was accomplished on-site after completion of soil borings and prior to the drilling of each new borehole. Hollow flight augers, overshot assembly and other drilling accessories were steam-cleaned using a high pressure water spray from the assembly mounted on the trailer. The wash water was collected at the bottom of the trailer. The split-spoon sampler and the brass tubes containing the upper and the lower samples were also cleaned and decontaminated prior to their use. They were thoroughly scrubbed by a Site Technician with water containing tri sodium phosphate, and double-rinsed with distilled water prior to each sampling reassembly on site in the restricted area, near the drilling rig. All wash water used in the decontamination of the sampling tubes was stored/placed in the collecting assembly of the trailer.

7.6 Abandonment of Boreholes

All completed borings were backfilled using bentonite clay grout (Volclay Grout), a high solid, fast-mix and low-permeability grout material which set up to form a solid clay plug. The backfilling was carried out from the bottom of the boring up to about 6 to 12 inches from the round surface. The remaining 6 to 12 inches were also backfilled using a ready mixed asphalt and/or concrete (Red-E-Crete #0090), after the volclay grout had set.

7.7 Disposal of Cuttings

The drilled cuttings were placed in the 55-gallon drums. All the drums were labeled as to the boring number, depth the cuttings were obtained, date of drilling and the name of the company which collected the samples. The drum were stored at the Maintenance Yard of the Airport Authority. The cuttings were disposed of as indicated by the results of the analytical tests. Only five drums required disposal as hazardous waste.

8.0 LABORATORY ANALYSIS OF SOIL SAMPLES

8.1 Summary of Sampling/Testing Schedule

A total of 90 soil samples were collected from the 5 borings. These include the 5 duplicate samples, one (1) sample from each hole. Soil samples were analyzed for chlorinated and aromatic volatiles, metals and total petroleum hydrocarbon. As shown in Table 5, Sampling and Analytical Tests Schedule, there were 90 EPA 8010/8020, 37 EPA 418.1 and 15 CAM Metals analyses.

Table 5: Sampling and Analytical Tests Schedule

Boring No.	<u>Depth</u>	Analysi	s (EPA M	ethod)	
CSB-1	2.5	8010,	8020,	418.1	
	4	8010,	8020,		CAM Metals
	9	8010,	,	•	= + **** *****
	14	8010,	•		CAM Metals
•	19	8010,			CAM Metais
	24	8010,			
	29	8010,	8020		
	34	8010.	8020		
	39	8010,	8020,	418.1	
	44	8010.	8020		
	49	8010,	8020		
	54	8010,	8020,	418.1	
	59	8010,	8020		
	64	8010,	8020		
	69	8010,			
	74	8010,			
	79	8010,	8020		
	DS-001-24'	8010,	8020		
CSB-2	1	8010,	8020,	418.1,	CAM Metals
	5	8010,	8020,	418.1	
	10	8010,			CAM Metals
	15	8010,	8020,	418.1	
	20	8010,	8020,	418.1,	CAM Metals
	25	8010,	8020,	418.1	
	30	8010,	8020		
	35	8010,	8020		
	40	8010,	8020		
	45	8010,	8020,	418.1	•
	50	8010,	8020		
	55	8010,	8020		
	60	8010,	8020		

CSB-4		Boring No.
. 45 15 15 15 15 15 15 15 15 15 15 15 15 15	16 15 26 26 36 36 46 46 56 66 67 67 68 68 68 68 68 68 68 68 68 68 68 68 68	Depth 65 70 75 80 DS-003-5
8010, 8010, 8010, 8010, 8010, 8010, 8010,	8010 8010 8010 8010 8010 8010 8010	Analysi 8010, 8010, 8010, 8010,
8020 8020 8020 8020 8020 8020 8020 8020	8020 8020 8020 8020 8020 8020 8020 8020	Analysis (EPA Method) 8010, 8020, 418 8010, 8020 8010, 8020 8010, 8020 8010, 8020, 418
418.1 418.1 418.1 418.1	418.1 418.1 418.1	ethod) 418.1
CAM Metals CAM Metals CAM Metals	CAM Metals CAM Metals	

Boring No.	<u>Depth</u>	Analysis (EPA Method)			
CBS-5	1	8010,	8020,	418.1,	CAM Metals
	5	8010,	8020,	418.1,	CAM Metals
	10	8010,	8020,	418.1,	CAM Metals
	15	8010,	8020,	418.1	
	20	8010,	8020,	418.1	
	25	8010,	8020		
	30	8010,	8020,	418.1	
	35	8010,			
	40	8010,	8020		
	45	8010,	8020		
	50	8010,	8020,	418.1	
	55	8010,	8020		
	60	8010,	8020		
	65	8010,	8020,	418.1	
	70	8010,	8020		
	75	8010,	8020		
	80	8010,	8020		
	DS-005-10'	8010,	8020,	418.1,	CAM Metals

Note: DS-001-24' - Duplicate sample indicating sample number and depth the sample was collected

8.2 Quality Assurance/Quality Control Program

The analytical tests were conducted by a local laboratory duly authorized by the Department of Health Services (DHS) to do such analyses. All analyses were conducted in accordance with EPA requirements, including the current CPL protocols, 40 CFR 136, EPA-600/4-79-020 (1983), EPA-600/4-82-057 (1982), SW-846 and other requirements which may be required by other regulatory agencies. All these regulatory requirements are normally included and formed the basis for the QA/QC Program of the duly certified laboratories. A brief enumeration of a QA/QC Program is included as Appendix 6.

9.0 DISCUSSION AND INTERPRETATION OF RESULTS

9.1 Results of the Soil Gas Survey

The soil gas survey was documented in the report by Target and appended herewith as Appendix 2. The following discussion was based on this report.

Elevated levels of 1,1,1-TCA, PCE and t-1,2-DCE and the lower concentration of TCE, MTBE/pentane, acetone, benzene, toluene and xylenes were detected within the area. The iso-concentration maps (Figures 2-8 in Appendix 2) generated for these solvents showed patterns which suggested that soil contaminations occurred at the immediate vicinity of the concrete wash down area. The highest levels of concentrations were found near the sump at the southeast corner of the east concrete pad. This suggests that the most probable source of contamination was the sump/drain. These findings are, in general, consistent with the results of analyses of soil samples collected from borings in the area.

a) Petroleum-based Compounds

Of the 9 standardized analytes, only 4 compounds were found above the detection limit in 43% of the vapor samples. These are MTBE/Pentane, xylenes, toluene and acetone. Table 6 lists the samples where these analytes were detected.

Table 6: Analytes Concentrations By GC/FID, (ug/l)

Sample No.	Location	MTBE/ Pentane	<u>Xylenes</u>	Toluene	Acetone
605	Near sump	19	3.1	1.9	<1
1005	Near sump	23	2.6	1.2	<1
1505	Near sump	18	<1	ব	<1
2005	Near sump	12	ব	<1	<1
606	SE of concrete pad	ব	<1	<1	<1
1006	SE of concrete pad	<1	ব	<1	<1
1506	SE of concrete pad	<1	<1	<1	ব
2006	SE of concrete pad	<1	<1	<1	<1
607	South of service road	<1	3	1,9	1,9
1007	South of service road	<1	2.8	1.7	1.6
1507	South of service road	<1	<1	<1	<1
2007	South of service road	<1	<1	<1	<1
610	South of service road	<1	1.2	1.1	<1
614	South of concrete pad	<1	ব	<1	<1
1014	South of concrete pad	<1	ব	<1	<1
1514	South of concrete pad	1.8	<1	<1	<1
2014	South of concrete pad	2.0	<1	<1	<1
615	South of concrete pad	<1	<1	1.2	1.2
1015	South of concrete pad	<1	ব	<1	<1
1515	South of concrete pad	<1	<1	<1	<1
2015	South of concrete pad	<1	<1	<1	<1
620	Concrete pad	<1	∢1	<1	<1
621	Concrete pad	<1	<1	<1	<1
1021	Concrete pad	<1	2.5	1.2	<1
1521	Concrete pad	<1	<1	<1	<1
2021	Concrete pad	2.1	<1	<1	<1

Sample No.	Location	ocation MTBE! Pentane		Toluene	Acetone
622	West of concrete pad	<1	<1	<1	<1
1022	West of concrete pad	<1	<1	<1	<1
1522	West of concrete pad	<1	ব	<1	<1

Note:

Sample No. indicates sampling location and depth where sample was taken. The first one or 2 digits correspond to depth sample was taken, i.e., "6", "10", "15" and "20" feet. The last 2 digits represent the sampling point number, i.e., "07", "10", "14", etc.

The highest concentration of MTBE/pentane was near the southeast sump or drain of the east concrete pad (Samples 605 to 2005). Sample 620 and 621 to 2021 were obtained from the subsoil beneath the concrete pad. Samples 614 to 2014 were collected near the new service road south of the concrete pad. The pattern of these concentrations suggested that source of contamination is the vicinity of the wash down concrete containment, most likely the source point was the sump or drain probably due to overspill or leakages.

Total FID plots (Figure 4 of Appendix 2) showed the same pattern as that of MTBE/pentane. Xylenes, however, were found in 2 general vicinities: at the wash down area near the sump and at the area south of the service road where it curves from a northwesterly to westerly direction. Borings of Lockheed (BH 24, SB-16, SB-49 and SB-51, Tables 1 and 2) show TPH from 320 to 3468 mg/kg near the sump and as much as 500 mg/kg south of the service road. These are consistent with the distribution pattern of Xylenes.

Toluene were found in lower concentration and appeared to be scattered throughout the area. Because of the lack of certain pattern, it may be deduced that this aromatic may be related to vehicular use.

b) ECD Compounds

Of the 11 chlorinated solvents which may be identified by the GC/ECD, only 4 solvents were found above their detection limits. These compounds are t-1,2-DCE, 1,1,1-TCA, TCE and PCE. While the concentration values of these compounds are relatively low, the iso-concentration maps indicate certain pattern or trend.

Table 7 indicates the samples where the analytes where found.

Table 7: Analyte Concentrations By GC/ECD, (ug/l)

Sample No.	Location	M.2-DCE	1.1.1-TCA	ICE	PCE
601	Service road	ব	0.93	0.14	0.92
502	North service road	ব	4.0	0.35	2.0

Sampie No.	Location	1-1.2-DCE	1.1.1-TCA	ICE	PCE
603	North of concrete pad	<1	10	0.30	3.3
604	North of concrete pad	2.4	11	0.15	3.0
605	Near sumps	20	82	0.77	14
1005	Near sumps	38	135	0.46	16
1505	Near sumps	30	109	0.38	1
2005	Near sumps	23	75	0.32	9.7
606	SE of concrete pad	ব	3.8	0.11	1.5
1006	SE of concrete pad	ব	2.0	<0.1	0.71
1506	SE of concrete pad	ব	5.0	<0.1	1.5
2006	SE of concrete pad	ব	6.8	0.14	1.8
607	South of service road	1.9	1.2	0.59	2.0
1007	South of service road	<1	0.13	0.16	0.90
1507	South of service road	<1	3.8	<0.10	0.98
2006	South of service road	<1	4.7	0.14	1.1
608	South of service road	<1	1.3	0.22	1.3
60 9	South of service road	· <1	0.60	0.18	1.2
610	South of service road	<1	0.86	0.42	1.8
611	South of service road	<1	0.94	0.23	1.3
1012	North of service road	<1	6.9	0.11	1.7
1512	North of service road	ં તાં	5.5		1.2
2012	North of service road	1.5	11	<0.10	1.5
613	South of FAA	<1.0	3.9	0.16	1.
614	South concrete pad	<1.0	14	0.20	2.6
1014	South concrete pad	<1.0	7.9	0.12	2.1
1514	South concrete pad	<1.0	15	0.13	2,5
2014	South concrete pad	<1.0	14	0.13	2.3
615	Service road	<1.0	3.8	0.14	1.3
1015	Service road	<1.0	3.5	0.10	0.87
1515	Service road	<1.0	5,5	<0.10	1.3
2015	Service road	<1.0	5.4	<0.10	1.2
616	South of service road	<1.0	1.3	0,30	1.3
1016	South of service road	<1.0	3.5	<0.10	0.87
1516	South of service road	<1.0	<0.10	<0.10	<0,05
2016	South of service road	<1.0	3.4	0.12	0.9
617	Service road	<1.0	3.8	0.13	1.5
618	Service road	<1.0	2.8	0,19	1.5

Sample No.	Location	t-1.2-DCE	1.1.1-TCA	TCE	PCE
619	Near sump	1.2	15	0.27	5.3
620	Concrete pad	22	1.3	0.49	9.1
621	Concrete pad	<1	7.5	0.22	2.9
1021	Concrete pad	<1	6.1	0.28	2.4
1521	Concrete pad	1.1	1.9	0.10	0.89
2021	Concrete pad	2.4	12	0.13	2.2
622	West of concrete pad	ব	2.7	0.57	2.7
1022	West of concrete pad	<1 ⋅	4.5	0.12	1.
1522	West of concrete pad	ব	3,9	0.17	1.4

Plotting of the iso-concentrations showed a pattern of increasing levels toward the vicinity of the sump/drain adjacent to the FAA facilities which was also of the same pattern as the FID compounds. TCE, however, also showed another two peaks in the area south of the service road and also at the area west of the concrete pad.

9.2 Analytical Tests Results

All of the 90 soil samples were analyzed by Curtis and Tompkins, Ltd. (CT), a Los Angeles-based laboratory duly certified by the California Department of Health Services (DOHS). The complete results of analyses were compiled in Volume II of this report.

Tables 8, 9, and 10 show the results of the laboratory tests of some of the organics and other compounds which exceeded the laboratory's detection limits. The major contaminant is petroleum hydrocarbon found in 4 borings. Significant concentration of halogenated volatiles were detected in only one boring, CSB-1.

9.2.1 Total Recoverable Petroleum Hydrocarbon (TRPH)

Table 8 shows the results of the analyses by EPA Method 418.1.

Table 8: Results of Analysis, TRPH

Boring No.	Depth (feet)	Concentration. (mg/kg)
CSB-1	2.5	11,000
	4	68
	9	11
	14	ND

Boring No.	Depth (feet)	Concentration. (mg/kg)
CSB-1	19 24 39 54	22 ND ND ND
CSB-2	1 5 10 15 20 25 45 65	7,800 ND ND ND 45 ND ND
CSB-3	1 10 20 30 50	11 29 29 ND ND
CSB-4	5 15 25 35	ND ND ND ND
CSB-5	1 5 10 15 20 30 50 65	2,300 ND 190 23 ND ND ND ND

Note: Detection Limit - 10 mg/kg

The significant occurrence of petroleum hydrocarbon was confined within near surface (1 - 2.5 feet), although trace concentrations were found at about 20 feet. A highly contaminated sand layer was found within 1.5 to 3.5 feet in boring CSB-1. The sand materials were black, oily and exuded petroleum odor. The highest concentration value of 11,000 mg/kg found at 2.5 feet may be related to these materials.

Boring CSB-1 was drilled adjacent to the sump/drain at the southeast corner of the east wash down concrete containment pad. Previous borings by McLaren-Hart near the same drain also detected petroleum hydrocarbon at 4 feet and 14 feet with concentration of 320 mg/kg and 3468 mg/kg, respectively (Table 2).

TRPH (7800 mg/kg) was also detected in CSB-2 at 1 foot. While no petroleum hydrocarbon was found between depth of 5 and 15 feet, 45 mg/kg TRPH was found at 20 feet. During ALB shallow soil boring in 1990 (Ref. 5), 15,000 mg/kg and 880 mg/kg TPH was detected at 1 and 5 feet, respectively (Table 3). McLaren-Hart's also reported TPH of 230 mg/kg and 54 mg/kg concentration at 3.5 feet and 10 feet, respectively.

South of the new service road where it turns from a northwest-southeast to east-west direction, TPH was found near the surface with a concentration of 2,300 mg/kg. Previous exploration in the vicinity by McLaren-Hart and Gregg also encountered TPH ranging from trace to about 500 mg/kg with the higher concentration value detected near the surface.

Viewed from the distribution of the concentration values of TPH, it appears that the major source of contamination is the sump/drain at the southeast corner of the concrete pad.

The other 2 areas where contaminations were detected at the vicinity of borings CSB-2 and CSB-5 may be related to the previous spills as manifested by significant surface stains observed prior to the construction of the new service road (Ref. 5).

9.2.2 Aromatic Volatile Organics

Table 9 indicates the aromatics that were detected in the 3 confirmatory borings. Only about 6% of the total samples analyzed for EPA 8020 showed aromatic volatiles.

Table 9: Results of Analysis, Aromatic Volatile Organics

Borings Numbers	<u>Depth</u> (feet)	Anaiytes (ug/kg)	Concentration (ug/kg)	Detection Limit ug/kg
CSB-1	49	Xylenes (total)	20	10
	. 59	Xylenes (total)	10	10
CSB-2	1	Ethyl Benzene	12	5
		Xylenes (total)	130	10

Borings Numbers	<u>Depth</u> (feet)	Analytes (ug/kg)	Concentration (ug/kg)	Detection Limit ug/kg
CSB-4	5	Toluene Ethyl Benzene Xylenes (total)	8 12 110	5 5 10
	20,	Xylenes (total)	11	10

Note: *- Duplicate sample DS # 002

Method EPA 8020

Extraction EPA 5030 Purge and Trap

Based from the analytical results, the presence of xylenes, ethyl benzene and toluene may not be an area of concern. The concentration values of these volatiles were too low when compared with the DOHS State Action Level (SAL). SAL, for xylenes, ethyl benzene and toluene in the ground water are 620, 680 and 100 ug/l, respectively.

9.2.3 Halogenated Volatile Organics

Table 10 shows the solvents found in borings CSB-1 and CSB-2.

Table 10: Results of Analysis, Halogenated Volatile Organics

Borings Numbers	Depth (feet)	Analytes_	Concentration (ug/kg)	SAL (ug/l)	Detection Limit (ug/kg)
CSB-1	2.5	1,1-DCE 1,1-DCA 1,1,1-TCA PCE	1,200 62 96 390	6 20 200 4	25° 25° 25° 25°
	4 5	1,1,1-TCA	21	200	
	5	PCE	73	4	5
	24	PCE	34	4	5

Borings	<u>Depth</u>	Analytes	Concentration	SAL	Detection
Numbers	(feet)		(ug/kg)	(ug/l)	Limit (ug/kg)
CSB-2	1	1,1,1-TCA PCE	11 19	200 4	5 5

Note: 1,1-DCE - 1,1-Dichloroethene 1,1-DCA - 1,1-Dichloroethane 1.1.1-TCA - 1.1.1-Trichloroethane

PCE - Tetrachloroethene

SAL - State Action Level of analytes in drinking water

* - Raised detection limit due to higher presence of target analytes

Analyses by EPA Method 8010 and extraction by EPA 5030 Purge and Trao

In the absence of regulatory limits of the detected solvents in soils, the concentrations of these solvents may be compared with the drinking water standards for the purpose of assessing the impact of these compounds.

As shown in Table 10, 1,1-DCE exceeded SAL by a factor of 200, 1,1-DCA by 3 and PCE by about 100. While the compounds' concentrations decreased at depth, PCE extended to about 24 feet. The other solvent, 1,1,1-TCA detected was below SAL. Beyond 24 feet down to 80 feet, no halogenated solvents were found above detection limits.

Of the 90 soil samples analyzed for EPA 8010, the target analytes were found in about 4% of the samples.

These contaminants were found within the immediate vicinity of the wash down concrete pad adjacent to the sumps/drains and extended into the FAA facilities. This disposition may suggest that contamination was related to the washing operations by Lockheed.

9.2.4 CAM Metals

Analytical results of CAM metals, as shown in Table 11, indicated that the concentration values are insignificant and within the natural concentration of these elements (Table 12). Except for lead (Pb) in one soil sample in CSB-5, which was detected above the STLC, all of the other elements did not exceeded the STLC. Lead was detected at 9.4 mg/kg; however, it is less than 10 times STLC to which would have required a determination of the solube fraction.

Table 11: Analytical Results. CAM Metals (mg/kg)

<u>Soil</u> Berings	Depth (Ft.)	Sb	Ba	<u>Be</u>	Ç₫	Ωt	Co	Cu	Рb	Μo	Ni	Уa	Zn
_								_	_			OPER.	
CSB-1	4	ND	39	0.11	ND	3.8	4.2	9.5	ND	ND	2.5	13	24
	14	ND	30	0.12	GN	5,1	3.7	6.3	ND	ND	2.2	15	14
	19	ND	44	0,11	ND	3.2	3.5	17	ND	ND	2.3	11	26
CSB-2	1	3.3	55	0.13	0.71	9.4	5.7	14	ND	0.82	6.8	20	120
	10	ND	32	ND	0.25	2.8	3.6	11	ND	ND	2.3	8.6	17
	20	ND	36	ND	OM	5.6	4.5	0.2	ND	0.74	3.6	14	18
CSB-3	5	ND	45	ND	ND	6.7	3.3	ND	1.2	ND	2.6	11	24
	15	ND	36	0.10	ND	4.8	3.0	ND	2.0	ND	2.5	10	20
CSB-4	1	ND	77	0.20	ND	8.3	8.0	11	ND	0.90	4.4	24	31
	10	ND	44	0.14	ND	5.0	4.5	11	ND	0.61	2.7	17	16
CS8-5	1	ND	60	0.13	0.28	6.9	4.7	ND	9.4	ND	7.2	19	38
	5	ND	50	0.11	ND	4.4	3.4	ND	1.5	ND	2.4	12	21
	10	ND	43	0.10	ND	4.4	3.2	ND	1.7	ND	2.6	10	19

Note: As, Hg, Se, Ag and TI were not found above the limit of detction. ND - Non detected.

Table 12: CAM Metals Limits and Natural Concentration Ranges

Analyte	STLC (mg/l)	10 x STLC (mg/kg)	TTLC (mg/kg)	Natural Conc. Bange (mg/kg)
Sb- Antimony	15	150	500	0.2-500
As - Arsenic	5	50	500	0.2-97
Ba- Barlum	100	1000	10,000	70-5,000
Be- Beryllium	0.75	7.5	75	0.1-40
Cd- Cadmium	1	10	100	1.01-10
Cr - Chromium (T)	560	5600	2,500	1-1,000
Cr - Chromium (VI)) 5	50	500	
Co- Cobalt	80	800	8,000	1/70
Cu- Copper	25	250	2,500	2-300
Pb- Lead	5	50	1,000	1-700
Hg- Mercury	0.2	2	20	0.01-4,6
Mo- Molybdenum	240	3500	3,500	0.2-7
Ni - Nickel	20	200	2,000	<3-700
Se - Selenium	1	10	100	0.05-60
Ag- Silver	5	50	500	0.001-5
TI - Thallium	7	70	700	0.1-3
Va - Vanadium	24	240	2,400	7-500
Zn - Zinc	250	2500	5,000	10-2,000

10.0 CONCLUSION AND RECOMMENDATION

10.1 Summary of Geologic Findings

- The area investigated is underlain primarily of the silty to gravelly, fine to coarse sands, either poorly to well graded, clean materials (SP/SW). Coarse subsoils (GP/GW) occur at depth of 70 to 80 feet. The subsoils are characteristically permeable. This condition could enhance vertical rather than lateral migration of contaminants within the unsaturated (vadose) zone at least within the depth (80 feet) explored.
- The fine subsoils, silts and very fine sands, occur as thin and discontinous lenses this
 occurrence could not significantly retard downward migration of the contaminants.
- The interlayering (intertongueing) of the different types of materials is suggestive of the varying environmental conditions during deposition.
- 4) Drilling for monitoring wells in the general vicinity of the Lockheed facilities established the ground water table within the airport to be between 200 to 230 feet below the existing ground surface.

10.2 Summary of Analytical Results

- 1) The major contaminants are petroleum hydrocarbons. TPH is in the order of 2,300 11,000 mg/kg. While the highest concentration values were detected within the upper 5 feet, contamination in the order of 45 mg/kg was found at depth of 20 feet. Beyond this depth to 80 feet, no TPH was detected.
- Of the target halogenated analytes, 1,1-DCE, 1,1-DCA and PCE were detected at levels
 exceeding the DOHS action limit. These solvents, were only found in two boring
 locations, CSB-1 and CSB-2.
- While xylenes, ethyl benzene and toluene were detected in 3 borings, their concentrations were low as compared with the DOHS standards.
- CAM metals, while present in the soil samples, were below the STLC.

10.3 Conclusion and Recommendations

The results of the present soil investigation and study have confirmed that the subsoils beneath the property formerly leased to Lockheed were impacted by petroleum hydrocarbons, 1,1-DCE, 1,1-DCA and PCE with concentrations exceeding DOHS action levels. Some of these contaminants may be the breakdown products of TCE and PCE, which Lockheed had used as degreasing products (Ref. 6) during its operations.

There are three areas where significant concentrations of these volatiles were found. The most significant is the impacted area related to the sump/drain of the east concrete pad. The pattern of concentrations suggested that the source of contaminations is the sump/drain. The other two areas are located within the immediate vicinity of the sump/drain of the west concrete pad and area where the service road makes a curve. The contamination detected in these three areas may be related to previous spills and/or seepage from the drains.

The occurrence of contamination was confined within the upper 20 feet, decreasing in concentration from the upper 2.5 to 20 feet. With the ground water at 200 to 230 feet beneath the area, the chances of this source currently impacting ground water are low. Contaminants may be adsorbed and/or diffused before they reach the ground water.

Since the subsoils are relatively porous. Contamination was distinctly vertical rather than horizontal. Contaminants were found within the immediate vicinity of the sumps or drains and within areas where indications of previous spills were observed on the surface.

In view of the above, no further investigation is deemed necessary. However, it is recommended that the Airport Authority initiate negotiations with Lockheed concerning the clean-up of the leasehold property. Based on the present findings, it appears that soil excavation may be an appropriate remediation alternative.

The following clean-up levels are proposed for the Lockheed facilities:

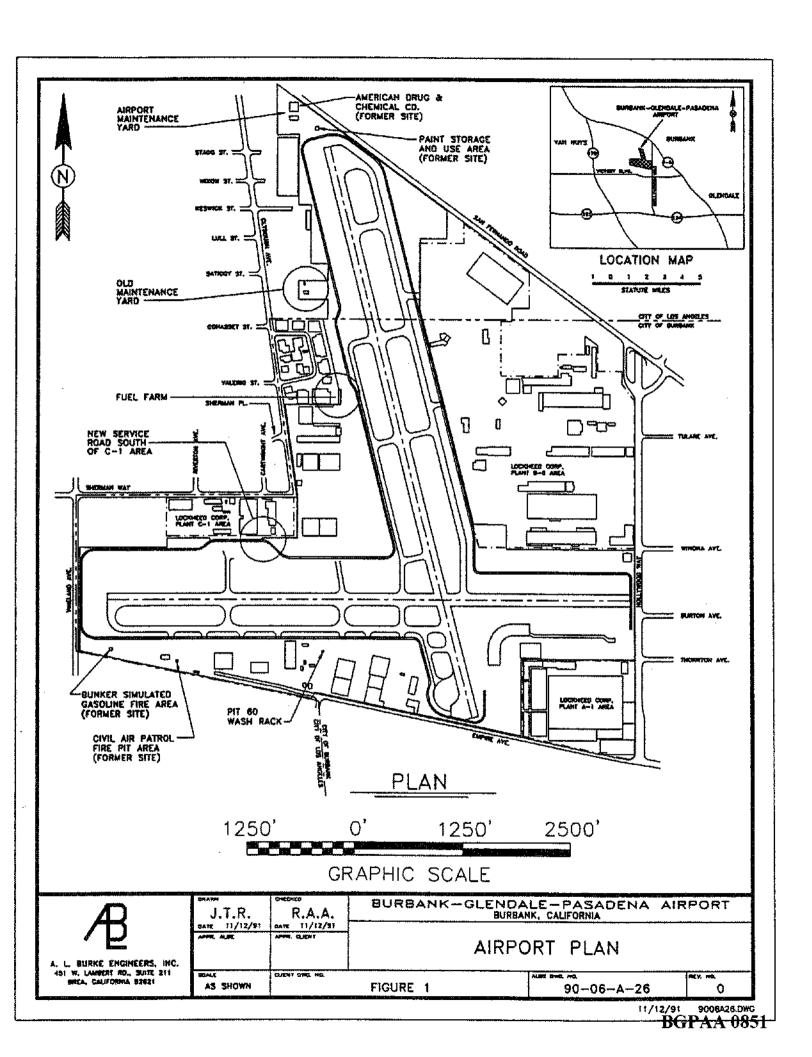
- A clean-up level of less than 1,000 ppm for TPH, as approved by the Los Angeles Department of Public Works for tank removal (Ref. 6)
- One hundred (100) times the Maximum Contamination Level or State Action Level for volatile halogenated organic compounds and volatile aromatics, non-halogenated volatile organic compounds and semi-volatile organic compounds, as recommended by McLaren-Hart (Ref.4).
- 3) Ten (10) times Soluble Threshold Limit Concentration for metals. Under this criteria, metals would not be an area of concern.

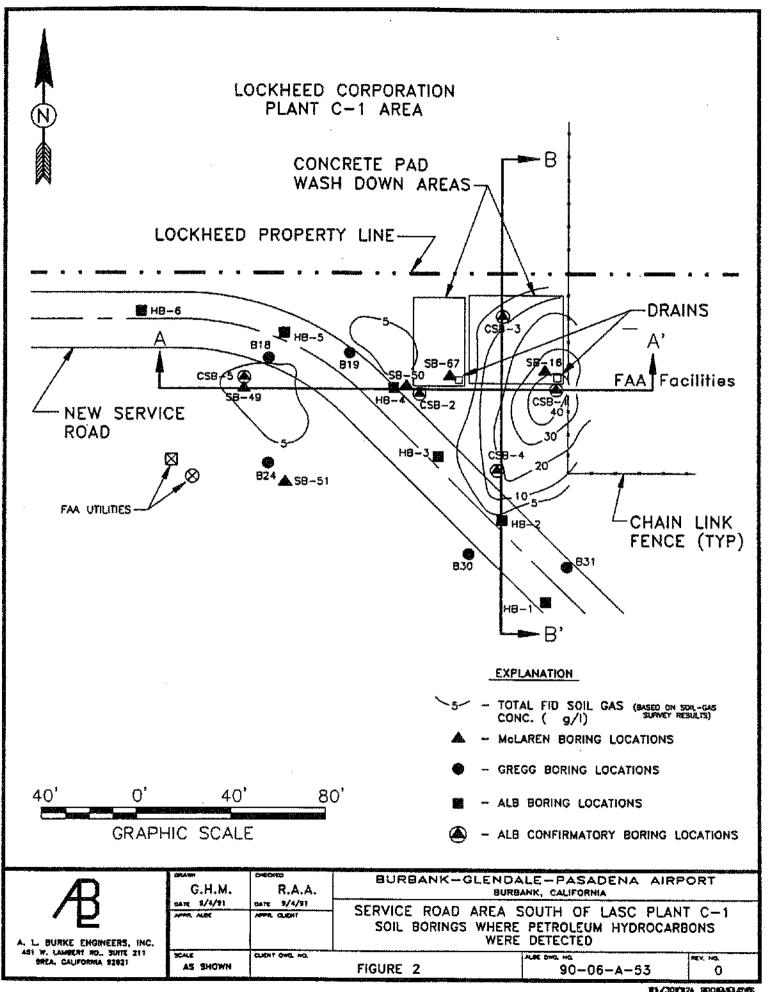
Since Lockheed is in the process of the remediation study (RI) for its Plant C-1, this leasehold area which has been impacted by its operation should be considered and included as part of this undertaking.

11.0 REFERENCES

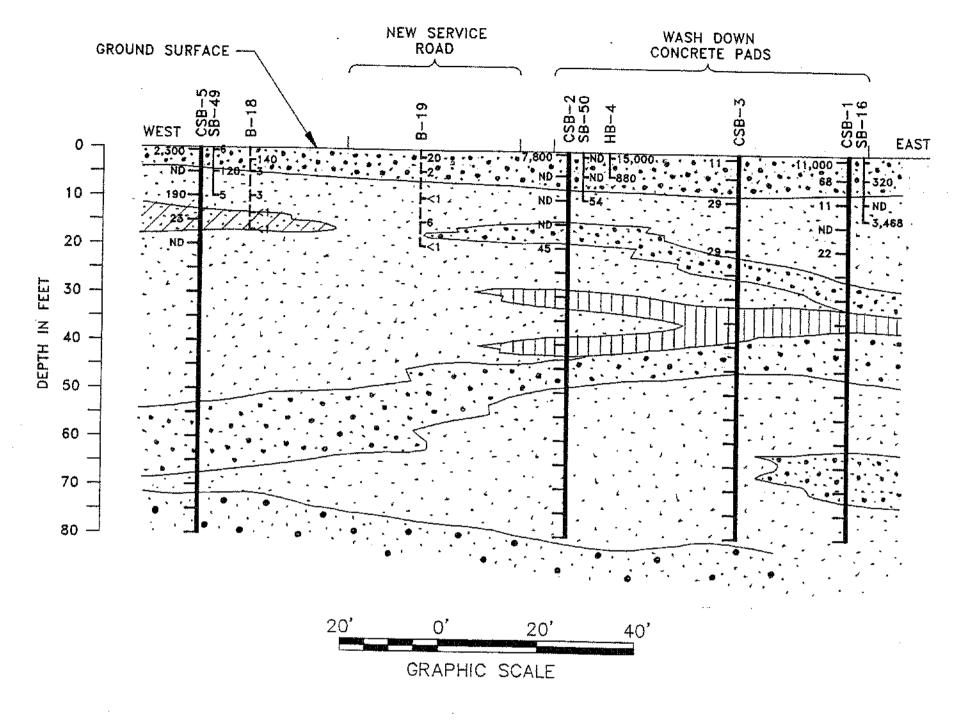
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- California Department of Water Resources, Bril. No. 104, Planned Utilization of the Ground Water Basins of the Coastal Plan of Los Angeles County, Appendix A - Ground Water Geology, June 1961, Reprinted April 1988
- Gregg and Associates, Inc., Results of Subsurface Investigation Beneath Metal Salvage and Drum Storage Area, Lockheed Aeronautical System Company Plant C-1, Burbank, California, April 4, 1988

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- 5) A. L. Burke Engineers, Inc., Site Characterization Service Road, Phase 1: Soil and Soil Gas Sampling, Burbank-Glendale-Pasadena Airport Authority, Burbank, California, July 1990
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EXPLANATION



SOIL TYPES:

- POORLY GRADED, GRAVELLY SANDS; LITTLE OR NO FINES (SP)

- WELL GRADED, GRAVELLY SANDS; LITTLE OR NO FINES (SW)

- CLAYEY SANDS; POORLY GRADED; SAND-CLAY MIXTURE (SC)

- INORGANIC SILTS - FINE SANDS (ML)

- POORLY GRADED, SANDY GRAVELS (GP)

- WELL GRADED, SANDY GRAVELS (GW)

OTHER SYMBOLS:

- GEOLOGIC CONTACT (EXTRAPOLATED FROM BORING DATA)

7,800 - SOIL BORING (DASH WHEN PROJECTED) SHOWING CONCENTRATION VALUES OF TRPH/TPH IN mg/kg

NOTE:

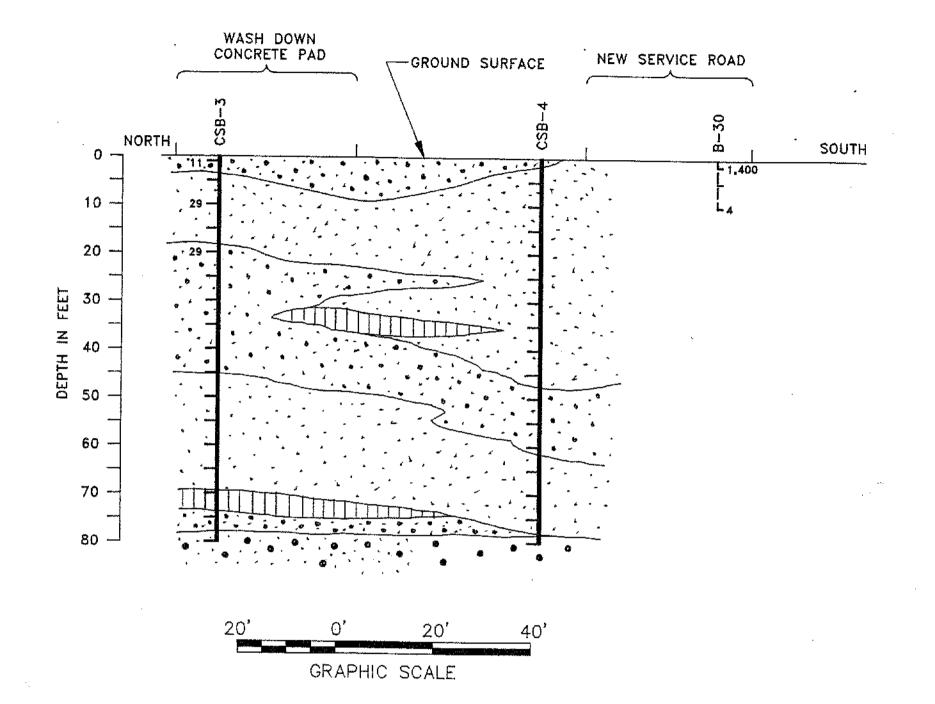
CSB - CONFIRMATORY SOIL BORINGS CONDUCTED BY A.L.B. IN 1991

SB - SOIL BORING CONDUCTED BY MCLAREN-HART IN 1991

HB - SHALLOW BORING CONDUCTED BY A.L.B. IN 1990

B - SOIL BORING CONDUCTED BY GREGG AND ASSOCIATES IN 1988

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EXPLANATION

SOIL TYPES:

- POORLY GRADED, GRAVELLY SANDS; LITTLE OR NO FINES (SP)

- WELL GRADED, GRAVELLY SANDS; LITTLE OR NO FINES (SW)

- CLAYEY SANDS; POORLY GRADED; SAND-CLAY MIXTURE (SC)

| | | | - INORGANIC SILTS - FINE SANDS (ML)

- POORLY GRADED, SANDY GRAVELS (GP)

- WELL GRADED, SANDY GRAVELS (GW)

OTHER SYMBOLS:

- GEOLOGIC CONTACT (EXTRAPOLATED FROM BORING DATA)

7,800 - SOIL BORING (DASH WHEN PROJECTED) SHOWING CONCENTRATION VALUES OF TRPH/TPH IN mg/kg

NOTE:

CSB - CONFIRMATORY SOIL BORINGS CONDUCTED BY A.L.B. IN 1991

B - SOIL BORING CONDUCTED BY GREGG AND ASSOCIATES IN 1988

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APPENDIX - 1

Health and Safety Plan/ Emergency Action Plan

PROJECT HEALTH AND SAFETY PLAN/ EMERGENCY ACTION PLAN

1.0 Introduction

The purpose of this Occupational Health & Safety Plan is to define the potential exposures and exacerbating conditions and to describe, in detail, those activities and procedures required to protect workers from hazardous exposures.

2.0 Job Descriptions

To expedite the sampling program, multiple crews, each with its own equipment, may be operating at the sites at any given time. The job classifications will be the same for each crew. A member of the crew may, in some cases, perform more than one job assignment. For example, because of the small crew size, the site geologist/engineer may function as site safety officer, and the field technician may double as safety technician. Job classifications and their assigned tasks are listed below:

- 2.1 Project Safety Officer: This classification will be responsible for the overall implementation and auditing of the Health & Safety Program. He/she may visit sites unannounced to evaluate compliance, and, at the end of the project, will complete an evaluation of the overall effectiveness and enforcement of the program. Eugene Port, CIH, will function in this capacity.
- 2.2 Site Engineer/Geologist: This classification will supervise site activities, including the handling of samples. If a drilling rig is used to obtain subsurface samples, the site engineer/geologist will examine the soil cuttings from each boring and compile a log of the subsurface conditions. He/she will handle the cuttings and work near the drill rig in the restricted area, and will be responsible for the sampling operation which will entail decontaminating (cleaning) and reloading the sampler with brass rings, labeling and packaging samples for transport. This latter activity will be performed in the controlled access area. Mollie Halewijn, P.E.d will function in this capacity.
- 2.3 Technician: This classification will assist the site engineer/geologist with sample handling in the restricted and controlled access areas. Activities will include sampling, decontamination of sampling equipment, and labeling and preparation of samples for transport.
- 3.0 Scope and Purpose of Health and Safety Program
- 3.1 Protect Worker Health and Safety. There may exist situations during site operations where personnel could contact toxic materials. If a drilling rig is used, it may generate a slight amount of dust from its operation and sample extraction.
- 3.2 Comply With Applicable Regulations. ALB will comply with all Federal and State Occupational Health & Safety regulations specified under OSHA. Specifically, the following General Industrial Safety Orders (GISO) are incorporated into our program.

3.2.1 GISO 3203 Accident And Illness Prevention Program

- Administrative supervision of the health and safety program. The Site Safety Officer, is responsible for the day-to-day implementation of this program. The Project Safety Officer will be responsible for staff and employee training and for auditing compliance with the requirements and intent of the program.
- Task and job safety analyses. These are included as described above.
- Training of workers in specific and general work practices. All supervisory personnel (Project Safety Officer, Site Engineer/Geologist, Site Safety Officer) will be certified under the provisions of 29 CFR 1910. All other personnel, who will work under the direct supervision of one of the aforementioned categories, will have a minimum of eight hours of training prior to the start of field work. This training will cover toxicology, protective equipment, evacuation and emergency response procedures, medical emergency procedures, mechanical and equipment safety, sample handling, decontamination and security measures.
- Work zones (restricted, controlled access and neutral). These are described in Section 4.0.
- Regular periodic inspections of the workplace to discover and correct unsafe conditions and work practices.- The Site Safety Officer will conduct a pre-shift inspection of the facility, machinery, equipment, safety devices and equipment, etc. The Project Safety Officer may inspect the sites at his/her discretion.
- Specific health and safety hazard awareness- as part of the general project and specific task assignments, employees will be informed by ALB of the specific hazards--including toxic exposures, noise, and heat stress--associated with the job and work site prior to start up on each new site.
- Warnings and evacuation routes, plus appropriate health and safety contracts- a list
 of emergency telephone numbers and site map will be given to personnel working on
 this project.
- Emergency procedures for:

<u>Spills</u>: Contaminated bulk materials will be placed in containers, sealed, and held until transport to an approved hazardous waste disposal site. Liquids will be treated with an appropriate spill clean up kit (acids, alkali and organics), and stored as mentioned above.

<u>Fire</u>: The following steps are to be taken to prevent injury and to limit the spread of the emergency: alert personnel in the immediate vicinity of a fire; confine the fire by removing items which be fuel to the fire, provided this can be done without risking being burned or overcome by smoke; evacuate the area; and summon aid, namely the local fire department.

<u>First aid emergencies</u>: Minor first aids should be treated by the site individual selected and trained in advanced first aid. Emergency victims will be removed from the immediate disaster area, stabilized, and transported by ambulance. ALB has selected the Paramedics as the first stage emergency response for injury and/or chemical exposures, including heat stress.

- Response to extreme weather conditions, such as wind, lightning, floods, etc.- severe winds, flooding or electrical storms will dictate that all site activity be halted.
- Personnel protective clothing and devices, as described under specific requirements for each site, will be used. ALB will supply those items described in the site-specific provisions. Workers will be responsible for providing their own coveralls, prescription eyewear, and safety shoes. Other appropriate clothing, shoes or boots and eye protection, as dictated by this health/safety plan, will be explained by the field supervisor.
- Laundering of contaminated clothing- ALB will be responsible for having contaminated clothing laundered and returned to the employees. Under no circumstances are employees to remove contaminated clothing from the work site.
- Rules regarding eating, drinking and smoking at the job site-- these activities are limited to the neutral area.
- Medical surveillance, including post job and emergency medical care (emergency treatment facilities). Employees will be examined, where required, to establish blood chemistry profiles and to determine liver and kidney function. Other tests will be included as determined by site-specific requirements. The nearest medical facilities are listed in the Emergency Action Plan.
- Emergency site evacuation, including transport of victims paramedics emergency response team will be available to move victims to emergency care facilities.
- *Buddy system*- this system is designed to establish working partners who will
 observe physiological and behavioral changes in each other which may be attributed
 to an occupationally related illness.
- Environmental surveillance- to the extent that we have been able to specifically identify chemical toxicants, continuous area air monitoring may be conducted to quantify exposures.
- 3.2.2 GISO 5194 Material Safety Data Sheets. All employees will be notified of all hazardous substances present in the workplace. Material Safety Data Sheets and potential toxic effects of substances that may be encountered during operations will be explained to the field personnel by ALB.
- 3.2.3 GISO 3204 Access To Medical And Exposure Records. Each person assigned to the field will be provided with a copy of his or her own medical records and records of exposures to toxic substances or harmful physical agents; and MSDS or other information available on the hazardous substances associated with the site activities.
- 3.2.4 GISO 5155 Control Of Airborne Contaminants. Every effort will be made to limit the generation of airborne contaminants, including water sprays where necessary.

- 3.2.5 GISO 3220 Emergency Action Plan. The emergency action plan (Appendix 2) describes procedures for reporting fire and other emergencies, emergency procedures, escape routes, accounting for all workers after an emergency evacuation, personnel assigned to rescue and medical duties, alarm systems, and an evacuation plan. Training in this plan will be conducted as part of the pre-work session.
- 3.2.6 GISO 5144 Respiratory Protection Program. This program will cover the following subjects:
 - selection and use of air purifying respirators, and air supplied, if necessary;
 - medical clearance for personnel required to wear negative pressure air purifying respirators;
 - instruction and training in use of respirator;
 - cleaning, sanitizing, repair and storage of respirators;
 - respirator fit testing;
 - posting of required respirator usage; and
 - quantification of potential exposures.

4.0 Work Area Descriptions

4.1 Restricted Area. That area around the drill rig or other sampling center from 10 to 25 feet radius, depending on site conditions. This perimeter may be extended, depending upon winds and dust blowing.

Employees in this area will wear protection consisting of hard hat or cap; gloves; long-legged pants; and closed-toed shoes. At the direction of the Site Safety Officer, or the Project Geologist/Engineer, all personnel in the restricted zone shall don a full-face respirator, or safety glasses/goggles with half-face respirator, and continue to wear this equipment until otherwise directed.

- 4.2 Controlled-Access Area. The area extending away from the perimeter of the restricted area to an additional distance of 10 to 25 feet, depending on conditions. This area may be eliminated for small sites, depending on the nature of operations being conducted. Clothing for employees in this zone shall consist of long-legged pants, short- or long-sleeved shirt, and closed-toed shoes. Hard hats and respiratory protection equipment shall be kept in ready-to-use condition in this zone.
- 4.3 Neutral Area. That area used for tasks not required to be preformed in the restricted or controlled-access areas, and extending out from the perimeter of the controlled-access area. Clothing requirements are the same as for the controlled-access zone.

5.0 Respiratory Protection Program

5.1 Qualification To Wear Negative Pressure Respirator. All personnel required to wear a negative pressure, air purifying respirator will have to display a minimum pulmonary function of 75% of predicted for FEV 1, FVC, FEF 25-75 and FEF1/FVC Ratio. Each individual will otherwise have to be physically fit to wear such a device, as determined by an examination by a physician.

5.2 Respirator Selection And Fit Testing. Each individual assigned to a "restricted" or "controlled access" area will be properly fitted with a full- or half- mask face piece air purifying respirator. Air purifying cartridges will meet the NIOSH Approval TC-23C-79/161/243/244/201 or 286.

Fit the facepiece on the nose bridge, making sure that you are able to breathe through the nose. Then swing the bottom of the facepiece into contact with the chin. Position the headbands with longest straps above the ears over the crown of the head, and the shortest straps below the ears, around the nape of the neck; then adjust for comfort by moving adjustment slides to lengthen or shorten straps. Adjust the straps just snug enough so that no air leaks around the facepiece. It is not necessary to pull the straps so tight that the respirator digs into the face.

The respirator must be subjected to the following tightness test before selection and each use. Test respirator for leakage using a positive pressure method. Lightly place palm over exhalation valve cover. Gently exhale. A slight pressure should build up inside the respirator. If any leakage is detected around the facial seal, readjust the head harness straps, and repeat the test until there is no leakage. If other than facial leakage is detected, the condition must be investigated and corrected before another test is made. A negative pressure test will be performed. Lightly place palms over cartridge or filter holders. Gently inhale and the facepiece should collapse against the face. The respirator must pass the tightness tests before the respirator is used. The respirator will not furnish protection unless all inhaled air is drawn through a suitable cartridge or filter, as described above.

The respirator must pass a qualitative fit test for final selection prior to each shift's use. This will be done by generating an irritant smoke (for filter cartridges) or amyl acetate banana odor (for organic cartridges). Generate the smoke or odor under the chin and around the bridge of the nose (keeping the eyes tightly closed). During this test, the individual should undergo various facial expressions, including grimacing and smiling. If the wearer passes this type of qualitative fit test, the respirator can be worn in atmospheres up to 10 times the respective threshold limit values (TLV).

- 5.3 Preparation For Respirator Use. There are five inspection points, listed below, that should be checked before donning the respirator. Under no circumstances should a respirator that fails inspection be used. The respirator should be repaired or replaced.
 - 5.3.1 Headbands: Check to see that the headbands still have their elasticity. Inspect for breaks or tears in the material and make sure all clips, fasteners, and adjusters are in place and working properly.
 - 5.3.2 Facepiece: Check facepiece for dirt, cracks, tears, or holes. Inspect the shape of the facepiece for possible distortion that may occur from improper storage. Make sure that rubber is flexible, not stiff. Check the aluminum yoke for cracks.
 - 5.3.3 Inhalation and Exhalation Valves: Check for cracks, tears, distortion, dirt, or build-up of material between valve and valve seat.
 - 5.3.4 Cartridge Holders: Check to make sure gaskets are in place; check for cracks and damage to threads.
 - 5.3.5 Cartridge and/or Filters: Make sure cartridges and filters are clean. Never try to clean a filter or cartridge by washing it or using compressed air. Inspect the cartridge, particularly the metal sealing band around the bottom, for dents, scratches, or other damage.

Thread cartridges into receptacles carefully. Hand tighten to prevent damage to threads and to insure a good seal against the gaskets. Insert appropriate filters into the appropriate filter cover. Never load a filter into the receptacle. Snap filter covers onto both receptacle or cartridges taking care not to damage filters.

The following conditions are indications that the cartridge or filters have served their useful life and should be replaced. Cartridges: Odor or taste of gases or vapors; eye, nose, or throat irritation. Filters: Excessive breathing resistance upon inhalation.

5.4 Respirator Maintenance And Cleaning. The facepiece (with cartridge removed) should be cleaned and sanitized after every use. A light dish soap solution followed by a blotting action and air drying will suffice. Never exceed 120° F temperature in order to avoid facepiece distortion. After cleaning and maintenance, and when not in use, each respirator should be stored in an air tight bag, such as a plastic refrigerator bag with twist-seal.

The respirator must be kept in good condition to function properly. When any part shows evidence of excessive wear or failure, it should be replaced immediately with the proper part. Extra parts will be readily available. Do not use parts from a different brand or type of respirator.

- 5.5 Contraindications For Chemical Cartridge Use. Many chemicals do not have an odor at a level low enough to give adequate warning of cartridge failure. All personnel must consult the manufacturer's instructions for a specific list of materials for which that respirator and cartridge should not be used.
- 5.6 Recordkeeping/Program Administration. The project supervisor will maintain a list of respirators assigned to each individual. Each individual will acknowledge in writing that they have received respiratory protection training, including the selection, care and maintenance of their respective respirators.

The project safety officer will be responsible for assuring that all individuals comply with the requirements of the program. He/she will randomly check each individual's respirator to assure compliance with the proper care and maintenance of the respirator and cartridge.

Employees found violating the terms of this implementation program will be issued a written warning upon first violation, followed by disciplinary action on the second violation and release from the project upon the third violation.

5.7 Program Audit. The Project Safety Officer will check records and may observe actual program compliance to assure that the terms and intent of the respiratory protection program are being followed.

EMERGENCY ACTION PLAN

Notification and Summoning Assistance. The following procedures should be used to summon assistance in case of emergency:

Fire: Dial 911 to call Firefighters in case of fire. A fire extinguisher is available with the drill rig for use in case of small fires. The first consideration will be personnel safety, and crews will be instructed not to attempt to handle emergencies where possible injury would result.

Medical Emergency: Dial 911 to summon the paramedics for situations requiring medical attention (serve bleeding, shock, heat stroke, major injuries, etc.). Administer first aid and institute emergency actions until paramedics arrive.

Medical Non-emergency: Patient should drive (or be driven) to Burbank Community Hospital at the intersection of Glenoaks Boulevard and Olive Avenue. From the Airport, turn right (south) on Hollywood Way, turn left (east on Empire Avenue, bear right (south) on Victory Boulevard to Olive Avenue. Turn left (northeast) on Olive and proceed over the I-5 Freeway to the Hospital. The telephone number is (818) 953-6500.

Other Non-emergency: Dial (714) 990-3382 for A. L. Burke Engineers, Inc.

Evacuation Procedures: In case of emergency requiring evacuation, notify SSP personnel immediately and follow their evacuation plan. Personnel shall assemble outside the plant gate after the evacuation to be accounted for and receive further instructions. No one shall reenter an evacuated site until the Site Safety Officer has given clearance to return.

Intra-Site Communications: Because of the small size of the crews and the work areas, oral communications shall be used to minimize the potential for confusion during and emergency. Where a telephone is not easily accessible from the work locations, ALB will provide a portable cellular telephone.

<u>Documentation:</u> The Site Safety Officer shall prepare a complete report on any emergency incident including the date, time, nature of the incident, action taken and final outcome. This information shall also be entered in the field log.

APPENDIX - 2

Soil Gas Survey, Burbank-Glendale-Pasadena
Airport, Burbank, California: Report Prepared
by Target Environmental Services, Inc.,
October 1991

SOIL GAS SURVEY BURBANK-GLENDALE-PASADENA AIRPORT BURBANK, CALIFORNIA



SOIL GAS SURVEY BURBANK-GLENDALE-PASADENA AIRPORT BURBANK, CALIFORNIA

PREPARED FOR

A.L. BURKE ENGINEERS, INC.
451 WEST LAMBERT ROAD, SUITE 211
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PREPARED BY

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9180 RUMSEY ROAD

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OCTOBER 1991

EXECUTIVE SUMMARY

On September 11 and 12, 1991, TARGET Environmental Services, Inc. (TARGET) conducted a soil gas survey at Burbank-Glendale-Pasadena Airport, Burbank, California in an area south of the Lockheed Corporation Area C-1. Samples were collected at 6 feet in all sampling locations and at multiple depths in nine locations and were analyzed by GC/FID and GC/ECD for petroleum and halogenated hydrocarbons, respectively.

Elevated levels of 1,1,1-TCA, PCE and t-1,2-DCE and lower levels of TCE, MTBE/pentane, acetone, benzene, toluene, and the xylenes were observed within the survey area. Map patterns of the halogenated hydrocarbons and MTBE/pentane suggest that the contaminants originated in or near the wash down areas. The low levels of petroleum hydrocarbons present in scattered locations around the survey are probably related to vehicular use. While the concentrations of halogenated hydrocarbons were typically of similar magnitude at all depths, the occurrences of non-halogenated hydrocarbons, with the exception of MTBE/pentane, were limited to the shallower samples.

Introduction .

A. L. Burke Engineers, Inc. contracted TARGET Environmental Services, Inc. (TARGET) to perform a soil gas survey in an area south of the Lockheed Corporation Area C-1 at the Burbank-Glendale-Pasadena Airport in Burbank, California. The purpose of the soil gas survey was to determine the presence and extent of volatile hydrocarbons in the subsurface. Ground water and soils information were not reported. The field phase of the soil gas survey was conducted September 11 and 12, 1991.

Detectability

The soil gas survey data presented in this report are the result of precise sampling and measurement of contaminant concentrations in the vadose zone. Analyte detection at a particular location is representative of vapor, dissolved, and/or liquid phase contamination at that location. The presence of detectable levels of target analytes in the vadose zone is dependent upon several factors, including the presence of vapor-phase hydrocarbons or dissolved or liquid concentrations adequate to facilitate volatilization into the unsaturated zone.

Terminology

In order to prevent misunderstanding of certain terms used in this report, the following clarifications are offered:

The term "feature" is used in reference to a discernible pattern in the contoured data. It denotes a contour form rather than a definite or separate chemical occurrence.

The term "occurrence" is used to indicate an area where chemical compounds are present in sufficient concentrations to be detected by the analysis of soil vapors. The term is not indicative of any specific mode of occurrence (vapor, dissolved, etc.), and does not necessarily indicate or suggest the presence of "free product" or "phase-separated hydrocarbons."

The term "anomaly" refers to an area where hydrocarbons were measured in excess of what would normally be considered "natural" or "background" levels.

The term "analyte" refers to any of the hydrocarbons standardized for quantification in the chromatographic analysis.

The term "vadose zone" represents the unsaturated zone between the ground water table and the ground surface.

The term "indicates" is used when evidence dictates a unique conclusion. The term "suggests" is used when several explanations of certain evidence are possible, but one in particular seems more likely. As a result, "indicates" carries a higher degree of confidence in a conclusion than does "suggests."

The terms "elevated" and "significant" are used to describe concentrations of analytes which indicate the existence of a potential problem in the soil or ground water.

Field Procedures

Soil gas samples were collected at a total of 49 locations, as shown in Figure 1. Samples were collected at multiple depths at most of the locations. The first one or two digits in the sample numbers represent the sampling depth, i.e., "6", "10", "15" and "20". The last two or three digits represent the sample location number.

To collect the samples, a van-mounted hydraulic probe was used to advance connected 3' sections of 1" diameter threaded steel casing down to the sampling depth. The entire sampling system was purged with ambient air drawn through an organic vapor filter cartridge. A teflon line was inserted into the casing to the bottom of the hole, and the bottom-hole line perforations were isolated from the up-hole annulus by an inflatable packer. sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 The self-sealing vial was detached from the sampling psiq). system, packaged, labeled, and taken to TARGET's on-site mobile laboratory for analysis. When equipment malfunctioned, the remaining samples were shipped to TARGET's corporate headquarters and analyzed in the home laboratory.

At sampling locations where samples were collected from more than one depth, the shallow sample was collected first, and then the probe was further advanced to collect deeper samples in the same manner as above. Prior to the day's field activities all sampling equipment and probes were decontaminated by washing with soapy water and rinsing thoroughly. Internal surfaces were flushed dry using prepurified nitrogen or filtered ambient air, and external surfaces were wiped clean using clean paper towels.

Field control samples were collected at the beginning and end of each day's field activities and after every twentieth soil gas sample. These QA/QC samples were obtained by inserting the probe tip into a tube flushed by a 20 psi flow of pre-purified nitrogen and collecting in the same manner as described above.

Three sample locations (Stations 1007, 1516 and 1521) were sampled a second time after the initial sample vials were broken during analysis.

Laboratory Procedures

The samples collected during the field phase of the survey were subjected to both of the following analyses. One analysis was conducted according to EPA Method 601 (modified) on a gas chromatograph equipped with an electron capture detector (ECD), but using direct injection instead of purge and trap. Specific analytes standardized for this analysis were:

1,1-dichloroethene (1,1-DCE)
methylene chloride (MC)
trans-1,2-dichloroethene (t-1,2-DCE)
1,1-dichloroethane (1,1-DCA)
cis-1,2-dichloroethene (c-1,2-DCE)
chloroform (CF)
1,1,1-trichloroethane (1,1,1-TCA)
carbon tetrachloride (CT)
trichloroethene (TCE)
1,1,2-trichloroethane (1,1,2-TCA)
tetrachloroethene (PCE)

The halogenated hydrocarbons in this suite were chosen because of their common usage in industrial solvents, and/or their degradational relationship to commonly used compounds.

The second analysis was conducted according to EPA Method 602 (modified) on a gas chromatograph equipped with a flame ionization detector (FID), but using direct injection instead of purge and trap. The analytes selected for standardization in this analysis were:

acetone
methyl tertiary butyl ether (MTBE)
methyl ethyl ketone (MEK)
benzene
toluene
chlorobenzene
ethylbenzene
meta- and para- xylene
ortho-xylene

These compounds were chosen because of their utility in evaluating the presence of fuel products, or petroleum-based solvents.

The Total FID Volatiles values were generated by summing the areas of all chromatogram peaks and calculated using the instrument response factor for toluene. Injection peaks, which also contain the light hydrocarbon methane, were excluded to avoid the skewing of the Total FID Volatiles (Totals) values due to injection disturbances and biogenic methane. For samples with low hydrocarbon concentrations, the calculated Total FID Volatiles concentration is occasionally lower than the sum of the individual analytes. This is because the response factor used for the Total FID Volatiles calculation is a constant, whereas the individual analyte response factors vary with concentration. It is important to understand that the Total FID Volatiles levels reported are relative, not absolute, values.

The analytical equipment was calibrated using an instrument-response curve and injection of known concentrations of the above standards. Retention times of the standards were used to identify the peaks in the chromatograms of the field samples and their response factors were used to calculate the analyte concentrations. The tabulated results of the laboratory analyses of the soil gas samples are reported in micrograms per liter ($\mu g/l$) in Tables 1 and 2. The first one or two digits in the sample numbers represent the sampling depth; i.e., "6", "10", "15" and "20". The last two or three digits represent the sample location number. Although "micrograms per liter" is equivalent to "parts per billion (ν/ν)"

in water analyses, they are not equivalent in gas analyses, due to the difference in the mass of equal volumes of water and gas matrices. Because pentane and MTBE co-elute, they are listed together in the table. The xylenes concentrations reported in Table 1 are the sum of the m- and p-xylene and o-xylene concentrations for each sample.

- For QA/QC purposes, a duplicate analysis was performed on every tenth field sample. Laboratory blanks of nitrogen gas (99.999%) were also analyzed after every tenth field sample.

A total of five samples vials (Samples 612, 1007, 1516, 1521, and 2022) were broken during analysis. Samples were recollected at three of the locations, as mentioned in the Field Procedures section; however, analytical data are not available for Samples 612 and 2022.

Discussion and Interpretation of Results

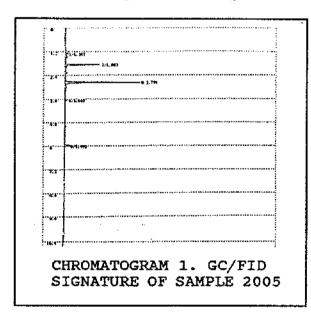
In order to provide graphic presentation of the results, individual data sets in Tables 1 and 2 have been mapped to produce Figures 2 through 8. Map sample points with no data shown indicate that the analyte concentrations in the sample were below the detection limit. Analytical data for all sampling depths are shown on the maps; however, contours respect the data obtained from the 6' sampling depth.

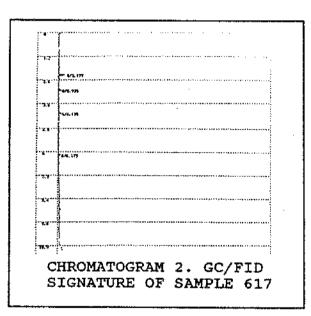
GC/ECD analysis revealed that 1,1,1-trichloroethane (1,1,1-TCA, Figure 2) was the most prominent halogenated hydrocarbon on the site. Concentrations of 1,1,1-TCA were highest beneath (Station 620) and south of the wash down areas (location 5). Concentrations in the soil gas were elevated at all depths (Stations 605, 1005, 1505, and 2005). Lower levels were present at all other sampling locations and at all depths. The tetrachloroethene (PCE) and trichloroethene (TCE) map patterns resemble the 1,1,1-TCA features and are not mapped separately. PCE and TCE were observed in all samples, with the highest concentrations observed in samples collected south of and beneath the wash down areas. The trans-1,2-dichloroethene occurrence (t-1,2-DCE, Figure 3) was limited to the area in and around the wash down area and to several isolated samples to the west and south.

GC/FID analysis indicated that Total FID Volatiles (Figure 4) were highest in and beneath the wash down areas. Low levels occurred at most of the remaining sampling locations. MTBE/pentane (Figure 5) were highest in and around the wash down areas. Xylenes (Figure 6) were present in low levels in several samples around the

wash down areas and in some samples across the service road. Low levels of acetone (Figure 7) occurred in several samples in and near the service road. A low level of benzene (Figure 8) was present at one sampling location (Station 607) near the service road.

The FID chromatogram signatures of samples with elevated levels of volatile hydrocarbons show isolated peaks typical of halogenated hydrocarbons, as exemplified by Chromatogram 1, Sample 2005. Peaks indicative of low levels of petroleum hydrocarbons are evident in the chromatograms of a number of samples, as exemplified by Chromatogram 2, Sample 617.





Elevated levels of 1,1,1-TCA, PCE and t-1,2-DCE and lower levels of TCE, MTBE/pentane, acetone, benzene, toluene, the xylenes were observed within the survey area. Map patterns of the halogenated hydrocarbons and MTBE/pentane suggest that the contaminants originated in or near the wash down areas. The low levels of petroleum hydrocarbons present in scattered locations around the survey are probably related to vehicular use. While the

concentrations of halogenated hydrocarbons were typically of similar magnitude at all depths, the occurrences of non-halogenated hydrocarbons, with the exception of MTBE/pentane, were limited to the shallower samples, i.e., samples collected at 6' and 10'.

TABLE 1

ANALYTE CONCENTRATIONS VIA GC/FID (ug/l)

SAMPLE	ACETONE	PENTANE/ MT8E ₁	HEK	BENZENE	TOLUENE	CHLORO- BENZENE	ETHYL- Benzene	XYLEMES	TOTAL FID VOLATILES ²
601	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
602	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6
603	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6
604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.3
605	<1.0	19	<1.0	<1.0	1.9	<1.0	<1.0	3.1	50
1005	<1.0	23	<1.0	<1.0	1.2	<1.0	<1.0	2.6	59
1505	<1.0	18	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40
2005	<1.0	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	27
606	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
						<1.0		<1.0	3.2
1006	<1.0	<1.0	<1.0	<1.0	1.1		<1.0		
1506	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.9
2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1
607	1.9	<1.0	<1.0	1.0	1.9	<1.0	<1.0	3.0	6.6
1007	1.6	<1.0	<1.0	<1.0	1.7	<1.0	<1.0	2.8	5.9
1507	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
2007	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.3
608	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
609	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
610	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	1.2	4.8
611	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
1012	∢1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.8	2.2
1512	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	≺1.0	2.1
2012	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6
613	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5
614	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.4
1014	<1.0	<1.0	<1.0	<1.8	<1.0	<1.0	<1.0	<1.0	3.6
1514	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.9
2014	<1.0	2.0	<1.0	<1.0	<1_0	<1.0	<1.0	<1.0	4.8
615	1.2	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	2.8
	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4
1015					<1.0	<1.0	<1.0	<1.0	1.6
1515	<1.0	<1.0	<1.0	<1.0					
2015	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.2
616	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	2.6	3.4
1016	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0
1516	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6
2016	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6
617	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1_0	<1.0	1.5
618	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6

MEK = Methyl ethyl ketone

¹ CONCENTRATIONS BASED ON RESPONSE FACTOR OF MTRE

 $^{^2}$ CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

TABLE 1 (cont)

ANALYTE CONCENTRATIONS VIA GC/FID (ug/l)

SAMPLE	ACETONE	PENTANE/ MTBE ₁	MEX	BENZENE	TOLUENE	CHLORO- BENZENE	ETHYL-	XYLENES	TOTAL FID VOLATILES ²
								MILL MILL	TVOTTELL
619	<1,0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.9
620	<1.0	. 17	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	26
621	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 -	<1.0	3.0
1021	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	2.5	3.8
1521	<1.0	<1.0	≺1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2021	<1.0	2.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.6
622	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6.0
1022	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	2,3
1522	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
FIELD CO	NTROL SAMPL	<u>E\$</u>							
101	<1.0	<1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
102	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
103	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
104	<1.0	<1.0	<1.0	<1.0	<1.0	<1.8	<1.0	<1.0	<1.0
105	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
106	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
LABORATO	RY DUPLICAT	<u>e analyses</u>							
1005	<1.0	23	<1.0	<1.0	1.2	<1.0	<1.0	2.6	59
1005R	<1.0	23	<1.0	<1.0	1.1	<1.0	<1.0	2.6	58
2006	<1.0	<1.0	<1,0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1
2006R	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.7
613	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5
613R	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1
1021	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	2.5	3.8
1021R	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	2.3
LABORATO	RY BLANKS								
10058	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2006B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
613B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1021B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

MEK = Methyl ethyl ketone

¹ CONCENTRATIONS BASED ON RESPONSE FACTOR OF MIBE

²CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE

TABLE 2

ANALYTE CONCENTRATIONS VIA SC/ECD (ug/l)

SAMPLE	11DCE	MC	t1200E	11DCA	c1200E	C#	111TCA	ст	TCE	112TCA	PCE
601	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.93	<0.05	0.14	<0.10	0.92
602	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	4.0	<0.05	0.35	<0.10	2.0
603	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	10	<0.05	0.30	<0.10	3.3
604	<1.0	<1.0	2.4	<1.0	<1.0	<0.10	11	<0.05	0.15	<0.10	3.0
605	<1.0	<1.0	20	<1.0	<1.0	<0.10	82	<0.05	0.77	<0.10	14
1905	<1.0	<1.0	38	<1.0	<1.0	<0.10	135	<0.05	0.46	<0.10	16
1505	<1.0	<1.0	30	<1.0	<1.0	<0.10	109	<0.05	0.38	<0.10	13
2005	<1.0	<1.0	23	<1.0	<1.0	<0.10	75	<0.05	0.32	<0.10	9.7
606	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.8	<0.05	0.11	<0.10	1.5
1006	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	2.0	<0.05	<0.10	<0.10	0.71
1506	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	5.0	<0.05	<0.10	<0.10	1.5
2006	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.8	<0.05	0.14	<0.10	1.8
607	<1.0	<1.0	1.9	<1.0	<1.0	<0.10	1.2	<0.05	0.59	<0.10	2.0
1007	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.13	<0.05	0.16	<0.10	0.90
1507	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.8	<0.05	<0.10	<0.10	0.98
2007	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	4.7	<0.05	0.14	<0.10	1.1
608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	1.3	<0.05	0.22	<0.10	1.3
609	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.60	<0.05	0.18	<0.10	1.2
610	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.86	<0.05	0.42	<0.10	1.8
611	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.94	<0.05	0.23	<0.10	1.3
1012	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.9	<0.05	0.11	<0.10	1.7
1512	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	5.6	<0.05	<0.10	<0.10	1.2
2012	<1.0	<1.0	1.5	-1 A	<1.0	<0.10	11	<0.05	<0.10	<0.10	1.6
613	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.9	<0.05	0.16	<0.10	1.9
614	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	14	<0.05	0.20	<0.10	2.6
1014	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	7.9	<0.05	0.12	<0.10	2.1
1514	<1.0	<1.0	<1.0	<1.9	<1.0	<0.10	15	<0.05	0.13	<0.10	2.5
2014	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	14	<0.05	0.13	<0.10	2.3
615	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.8	<0.05	0.14	<0.10	1.3
1015	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.5	<0.05	<0.10	<0.10	0.87
1515	<1.0	<1.0	<1.0	<1.9	<1.0	<0.10	5.5	<0.05	<0.10	<0.10	1.3
2015	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	5.4	<0.05	<0.10	<0.10	1.2
616	<1.0	<1.0	<1.0	<1.8	<1.0	<0.10	1.3	<0.05	0.30	<0.10	1.3
1016	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	1.8	<0.05	0.14	<0.10	0.96
1516	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	<0.05
2016	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.4	<0.05	0.12	<0.10	0.99
617	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.8	<0.05	0.13	<0.10	1.5

1,1-dichloroethene methylene chloride 11DCE MC trans-1,2-dichloroethene 1,1-dichloroethane 11DCA t120CE Œ = c120CE = cis-1,2-dichloroethene CF = chloroform

TCE = trichloroethene 112TCA = 1,1,2-trichloroethene
PCE = tetrachloroethene

TABLE 2 (cont)

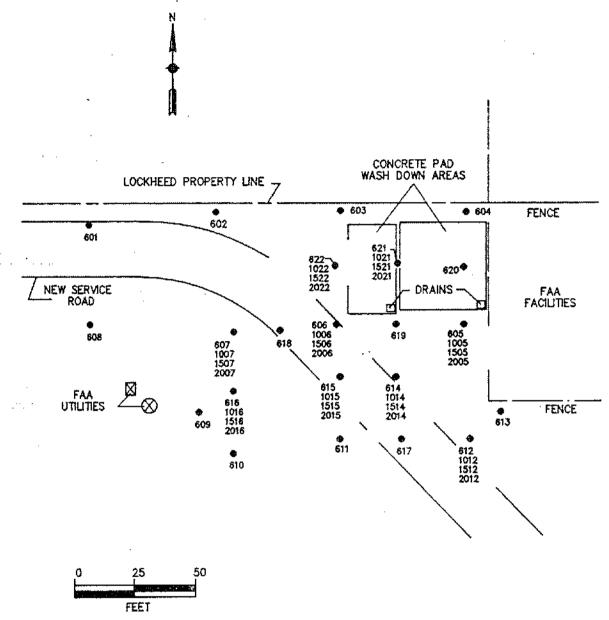
ANALYTE CONCENTRATIONS VIA GC/ECD (ug/l)

SAMPLE	110CE	MC	t12DCE	11DCA	c120CE	CF	111TCA	ст	TCE	112TCA	PCE
618	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	2.8	<0.05	0.19	<0.10	1.5
619	<1.0	<1.0	1.2	<1.0	<1.0	<0.10	15	<0.05	0.27	<0.10	5.3
620	<1.0	<1.0	22	<1.0	<1.0	<0.10	113	<0.05	0.49	<0.10	9.1
621	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	7.5	<0.05	0.22	<0.10	2.9
1021	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.1	<0.05	0.28	<0.10	2.4
1521	<1.0	<1.0	1.1	<1.0	<1.0	<0.10	1.9	<0.05	0.10	<0.10	0.89
2021	<1.0	<1.0	2.4	<1.0	<1.0	<0.10	12	<0.05	0,13	<0.10	2.2
622	<1_0	<1.0	<1.0	<1.0	<1.0	<0.10	2.7	<0.05	0.57	<0.10	2.7
1022	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	4.5	<0.05	0.12	<0.10	1.5
1522	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.9	<0.05	0.17	<0.10	1.4
FIELD CONTROL SAMPLES											
101	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	0.29
102	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	0.11
103	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	0.06
104	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	0.23
105	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	0.06
106	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	<0.05
LABORATO	RY DUPLIC	CATE ANALY	SES								
1005	<1.0	<1.0	38	<1.0	<1.0	<0.10	22	<0.05	0.46	<0.10	8.8
1005R	<1.0	<1.0	35	<1.0	<1.0	<0.10	55	<0.05	0.44	<0.10	8.8
2006	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.8	<0.05	0.14	<0.10	1.8
2006R	<1.0	<1.0	2.1	<1.0	<1.0	<0.10	6.9	<0.05	0.14	<0.10	1.7
613	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	3.9	<0.05	0.16	<0.10	1.9
613R	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	4_0	<0.05	0.11	<0.10	1.4
1021	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.1	<0.05	0.28	<0.10	2.4
1021R	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	6.0	<0.05	0.28	<0.10	2.4
LABORATO	RY BLAKKS	•									
613B	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0,10	<0.10	<0.05
10058	<1.0	<1.0	<1.0	<1.0	<1.8	<0.10	<0.10	<0.05	<0.10	<0.10	<0.05
1021B	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	<0.05
2006B	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05	<0.10	<0.10	<0.05

11DCE = 1,1-dichloroethene t12DCE = trans-1,2-dichloroethene c12DCE = cis-1,2-dichloroethene 111TCA = 1,1,1-trichloroethene TCE = trichloroethene PCE = tetrachloroethene

MC = methylene chloride 11DCA = 1,1-dichloroethane CF = chloroform

CT = carbon tetrachloride 112TCA = 1,1,2-trichloroethane



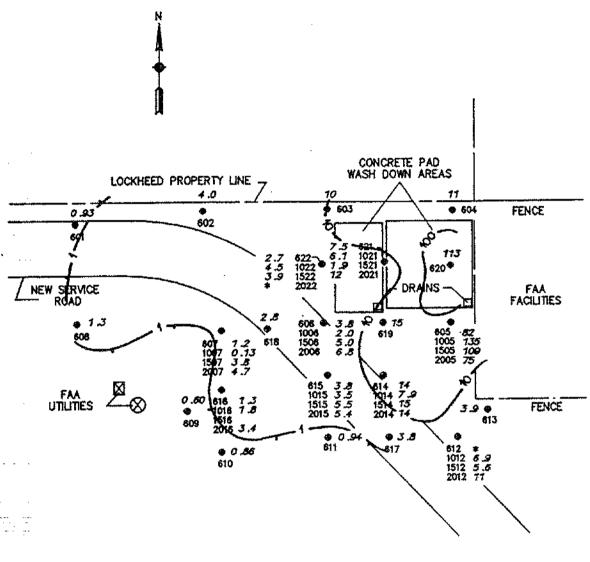
- SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

FIGURE 1. Sample Locations



This map is integral to a written report and should be viewed in that context.





- # SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

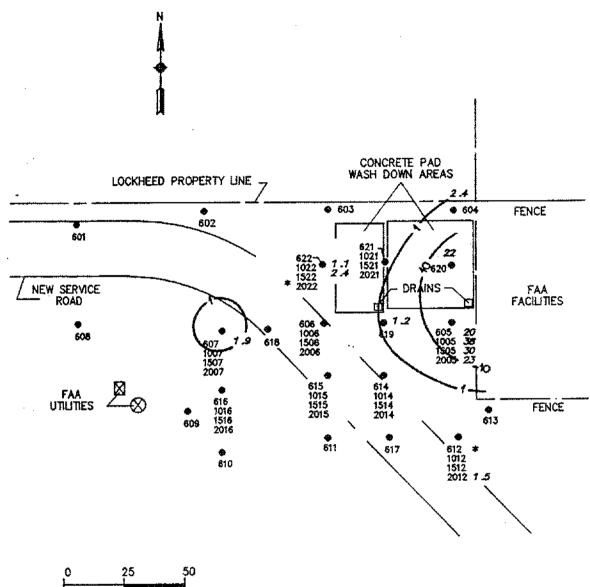
 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

FIGURE 2. 1,1,1—trichloroethane (1,1,1—TCA)

(#g/l)



This map is integral to a written report and should be viewed in that context.



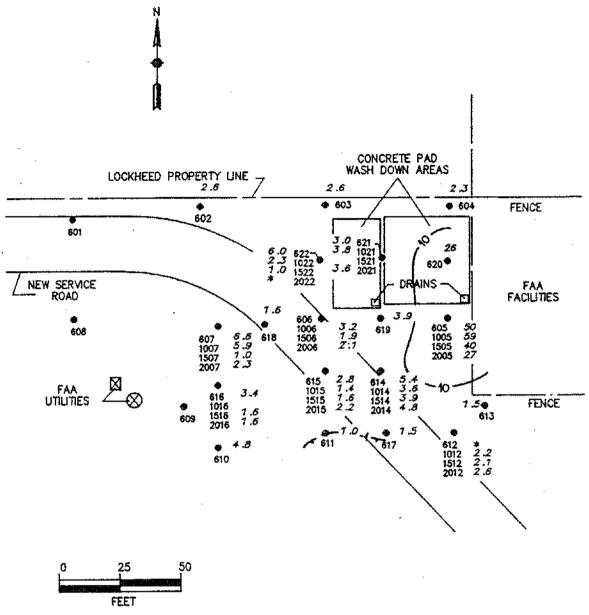


- SOIL GAS SAMPLE LOCATION
- DATA NOT AVAILABLE CONTOUR LINES RESPECT DATA OBTAINED AT THE 6' DEPTH.

FIGURE 3. trans-1,2-dichloroethene (t-1,2-DCE) $(\mu g/I)$



This map is integral to a written report and should be viewed in that context.



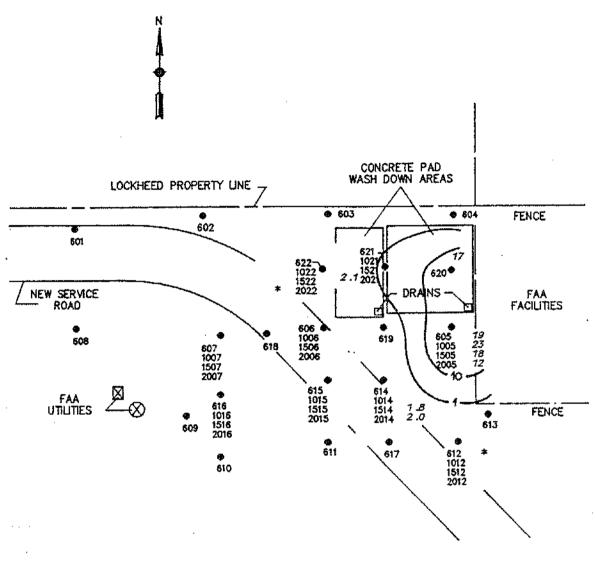
- SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

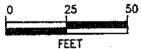
 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

FIGURE 4. Total FID Volatiles (calc'd µg/l)



This map is integral to a written report and should be viewed in that context.





- SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

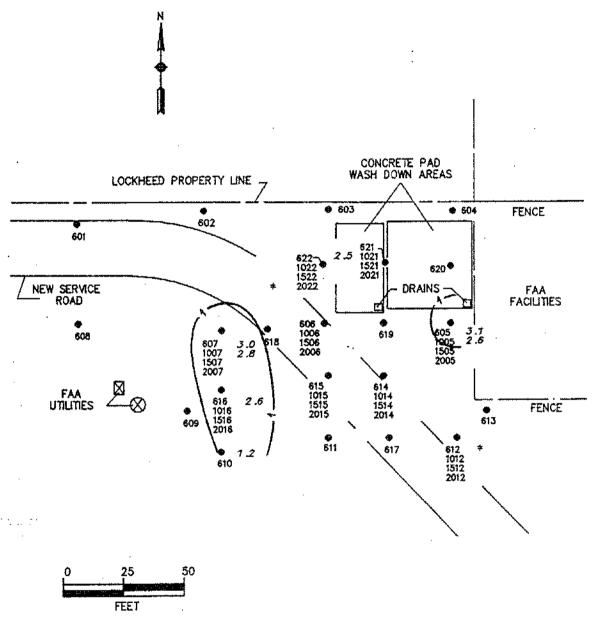
 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

FIGURE 5. Pentane/Methyl Tertiary
Butyl Ether (MTBE)

(µg/l)



This map is integral to a written report and should be viewed in that context.



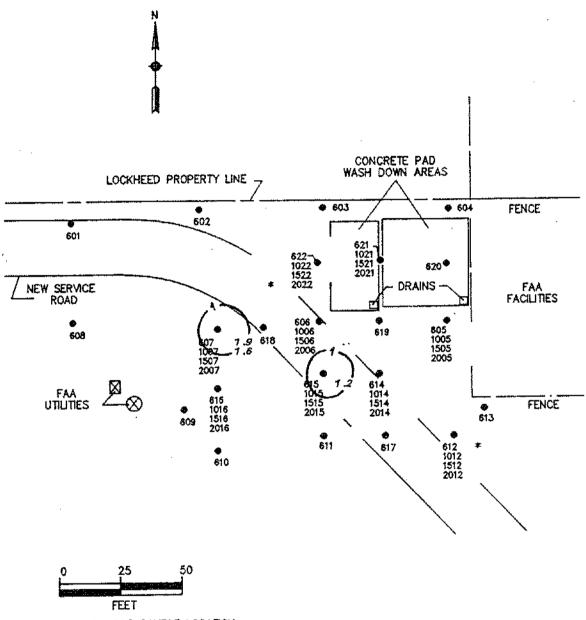
- SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

FIGURE 6. Xylenes (µg/l)



This map is integral to a written report and should be viewed in that context.



SOIL GAS SAMPLE LOCATION

* DATA NOT AVAILABLE

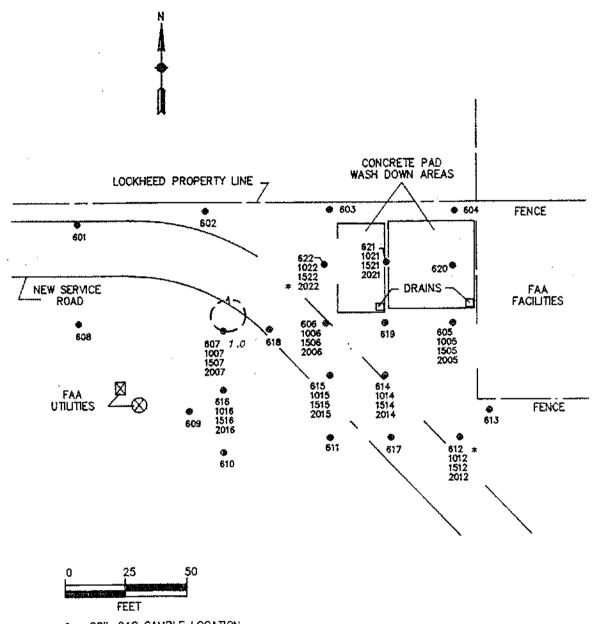
CONTOUR LINES RESPECT
DATA OBTAINED AT THE
6' DEPTH.

FIGURE 7. Acetone $(\mu g/I)$



ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report and should be viewed in that context.



- SOIL GAS SAMPLE LOCATION
- * DATA NOT AVAILABLE

 CONTOUR LINES RESPECT
 DATA OBTAINED AT THE
 6' DEPTH.

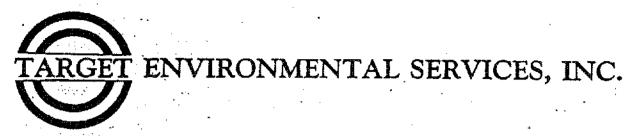
FIGURE 8. Benzene (µg/l)



This map is integral to a written report and should be viewed in that context.

APPENDIX - 3

Quality Assurance Project Plan for
Soil Gas Sampling Under Mobile Conditions,
Prepared by Target Environmental Services, Inc.



QUALITY ASSURANCE PROJECT PLAN for SOIL GAS SAMPLING UNDER MOBILE LABORATORY CONDITIONS

Prepared by
TARGET ENVIRONMENTAL SERVICES, INC.
9180 Rumsey Road
Columbia, MD 21045
(301) 992-6622

TABLE OF CONTENTS

1.0	TITLE PAGE	1
2.0	TABLE OF CONTENTS	2
3.0	PROJECT DESCRIPTION	3
4.0	PROJECT ORGANIZATION	3
5.0	QUALITY ASSURANCE OBJECTIVES	6
6.0	CALIBRATION	7
7.0	ANALYTICAL PROCEDURES	8
	DATA REDUCTION, VALIDATION, AND REPORTING	
	INTERNAL QC CHECKS	
10.0	AUDITS 1	3
11.0	PREVENTIVE MAINTENANCE 1	4
12.0	SOP FOR PRECISION, ACCURACY AND COMPLETENESS	4
13.0	CORRECTIVE ACTION	5
14.0	APPENDICES	6

3.0 Project Description

Samples will be subjected to analysis for the compounds specified by client.

Samples will be analyzed on a high quality gas chromatograph equipped with capillary columns, thermal oven, and with a data processor and associated hardware. Each instrument is appropriately calibrated at the beginning of the project, and as needed for the duration of the project using an instrument-response curve and injection of standards of known concentrations. Retention times of the compounds in the standards are used to identify the unknown compounds in field samples, and their response factors are used in calculating actual concentrations. Duplicate analyses will be performed on at least every tenth field sample (see QA/QC section).

This level of GC not only provides reliable identification and quantification of standard analytes, it also produces a chromatogram with enough resolution to match sample signatures with known contaminant signatures and determine (in many cases) the nature of the original product and its relative age.

We use both FID and ECD detectors for obtaining the best information on the compounds of interest. When assessing petroleum hydrocarbons we have found that a full signature analysis on a FID provides much more information than the results from a PID or any other detector. Since older spills are often degraded, analyzing for only a limited number of compounds may result in an occurrence being missed whereas a full analytical signature will allow successful identification and mapping of the spill. TARGET will use a GC/ECD for analysis of halogenated compounds.

Some compounds will coelute with other compounds. When this happens, the results will be reported as a coelutant pair. If further resolution is desired, a representative sample from any given area of interest will be selected for analysis by GC/MS. All GC/MS analyses will be performed by Maryland Spectral Services, Inc., Baltimore, Maryland.

4.0 Project Organization And Staffing Plan

This section presents TARGET's organizational structure and processes which are in place to successfully complete the project. Our management approach establishes well defined areas of responsibility, accountability and authority. Each person's charter relates to specific functional areas and prevents the potential confusion of overlapping responsibilities while covering all areas of necessary activity. The following is a concise description of the key project management team.

4.1 Project Manager

The Project Manager will have day to day responsibility for the work and is primarily responsible for technical scheduling and cost performance. He also will be the primary focal point for day to day communications with client's program management.

4.2 Health & Safety Director

The Health & Safety Director has responsibility for risk assessment and management, the design and documentation of all health and safety plans, supervision of all corporate health and safety concerns and requirements, instruction of the 40-hour health and safety course for field personnel, and first-aid training of all TARGET employees.

GREGORY A. BEAL is TARGET's Health and Safety Director for this project. His professional experience includes air monitoring using photoionization detectors, organic vapor analyzers, colorimetric devices, explosimeters and oxygen meters. He also has extensive experience in the operation of gas chromatographs.

4.3 QA/QC Director

The QA/QC Director is responsible for ensuring the integrity of all data collected during the screening process. He will also ensure that TARGET'S QA policies and standards are upheld, and review the analysis, interpretation and draft final reports for QA.

4.4 Senior Technical Review

TARGET is committed to providing clients with responsive high quality screening services. To assure this commitment, our sampling procedures, analysis, and final work product will be reviewed by a senior technical review committee. Members of the committee include:

JEFFREY T. SIMS is the Chief Scientist with TARGET. With expertise in soil, water and soil gas sampling and analysis methodology and statistical analysis, Sims is responsible for directing the research, development and evaluation of the soil gas technology used by the company. He also manages the implementation of computerized analytical and data processing systems. Prior to joining TARGET, he spent 6 years in the Geochemistry Division of Gulf Oil Corporation's Research and Development Company developing sample collection techniques, conducting domestic and international sampling surveys, and evaluating analytical results. He also has investigated the effects of environment, climate and compound interactions on soil gas

measurements. Sims is currently a member of AARST, AAPG, COGS, and AEG.

PATRICIA M. STEINHILBER, Ph.D. Her areas of expertise include soil chemistry, land management of municipal and industrial wastes, and environmental organic chemistry. She has brought with her to TARGET 11 years of experience in soil science investigations. For 7 years, she managed a soil testing laboratory engaged in soil analysis by atomic absorption spectrophotometry. Many of the soil investigation projects undertaken by this facility were for both private companies and government agencies. Dr. Steinhilber has also conducted extensive research on municipal and industrial waste, evaluating the toxic element concentrations in numerous soil samples.

J. EDWARD TILLMAN is the founder and President of The TARGET Companies, Inc. and its subsidiary, TARGET Environmental Services, Inc. Geochemistry and environmental project management are Mr. Tillman's areas of expertise. The 18 years of experience in these fields has afforded him the opportunity to develop and refine various forms of surface and subsurface sampling technologies which have been instrumental in the development of TARGET's full range of soil gas surveying methods. Prior to founding TARGET in 1981, Mr. Tillman's professional and management experience included serving as senior consultant for several major geotechnical consulting firms on numerous projects in the Middle East, Canada and most parts of the U.S. Tillman has published and presented numerous papers on the investigation of contaminants in the subsurface and has conducted seminars on environmental issues. He has chaired a committee on ground water problems for the State of Maryland and holds certifications from the American Association of Petroleum Geologists (#3159) and the American Institute of Professional Geologists (#6245). He is a registered geologist in the state of Delaware.

4.5 <u>Laboratory Personnel</u>

4.5.1 Target Personnel

ELIZABETH J. TIERNEY is Laboratory Director for TARGET. She directs all inhouse laboratory operations. She also oversees the maintenance and calibration of the various gas chromatographs. Her duties include method development and implementation of new chromatographic technologies. Before coming to work for TARGET she was employed in the GC-MS Laboratory for the State of Maryland Department of Health and Mental Hygiene. She was responsible for the analysis of water, sediment, and hazardous waste samples utilizing EPA methodologies to insure compliance with state and federal regulations.

RUSSELL C. URICH III serves as Manager in TARGET's environmental mobile

laboratory. His responsibilities include overall coordination of mobile lab scheduling, maintenance and servicing of GC's, troubleshooting, R & D and supervision of lab personnel. Mr. Urich was employed by Shimadzu Scientific Instruments for eight years as a Quality Assurance Engineer and supervised the assembly and QA of Gas Chromatographs. In this position, he implemented QA and manufacturing procedures for the Transformer Gas Analysis System which is in use worldwide for the analysis of dissolved gases in transformer oil. He also designed, fabricated and tested the "Weasel" gas manifold system for delivery of carrier gas. His degree is in Marine Engineering from Florida Institute of Technology.

SCOT E. REYNOLDS is the GC Supervisor in the environmental laboratory. His responsibilities are sample scheduling, operation of GC equipment, standards preparation, writing SOP's, calibrating instruments, data processing and maintenance of GC's. Mr. Reynolds majored in Chemistry at Rochester Institute of Technology. Before joining TARGET, he worked for three years as a Chemical Technician for Eastman Kodak Co.

MICHAEL MARRALE is the In-Field Analysis Coordinator for TARGET's Columbia office, the California Regional Office, and the St. Louis/Dallas Regional Office. He is responsible for the daily operations of the mobile laboratories as well as maintaining standard operating procedures and quality assurance/quality control procedures for field analysis. Mr. Marrale has a B.A. in Environmental Science from the University of Virginia.

5.0 Quality Assurance Objectives

5.1 Precision

Precision will be assessed by the comparison of duplicate samples. A duplicate analysis will be obtained for every tenth sample. Coefficients of variation of 75% will be achieved for every duplicate pair.

If the coefficient of variation exceeds 75% for any analyte in that pair, the cause will be determined.

5.2 Accuracy

Accuracy will be determined by the analysis of field blanks, lab blanks and check standards. The data quality objective with respect to field and lab blanks is to achieve analytical concentrations below the detection limit for all analytes. Percent recovery will be determined for each analyte in each check standard.

When contamination is determined to be present in a field blank, it will be

acknowledged in the quality assurance report. An explanation will be given as to the cause of the contamination. An assessment as to the effect of the contamination on the validity of the data from any field sample locations will be made.

5.3 Representativeness

Representativeness of data collection will addressed by careful preparation of the sampling program which specifies sufficient and proper numbers, frequency and location of samples, so as to assure that sample data accurately and precisely represent selected characteristics of the soil gas.

5.4 Completeness

Valid data will be obtained for at least 90% of the sampling locations.

5.5 Comparability

The duration of soil gas sampling activities will be minimized. Because meteorological conditions can affect analyte concentrations in soil gas samples, meteorological information will be collected in the field so that its possible effect on the soil gas data obtained can be addressed.

6.0 Calibration

6.1 GC/FID and GC/ECD Calibration

FiD analysis is conducted at Range One. ECD analysis is conducted at Range Zero. In both cases, a three-point least squares linear regression calibration curve is generated daily and the correlation coefficients are examined for each standardized analyte. Its correlation coefficient must be greater than 0.99. The curve is then used to quantify the concentration of analytes in samples. Alternatively, a one-point calibration at a higher range may be conducted when responses have exceeded the linear range of the detector's electrometer (using the highest standard concentration for the type of analysis standard to be analyzed, i.e., either FiD standard #3 or ECD standard #3). This one-point calibration is used to quantify the total volatiles of any sample if the original analysis was not quantifiable. Furthermore, a check standard is analyzed at the end of each day to ensure retention time and response stability. Windows for retention times will be set in the time band method, i.e. \pm a value. The value used will be the narrowest possible (usually 0.05 - 0.1) without including non-standardization peaks.

See Appendices I-IV for FID and ECD standard preparation protocol, calibration

check sheet and gas conversion factors.

The FID and ECD stock standards are replaced form pre-prepared (Scott Specialty Gases) cylinders that contain a mix of our standard analytes. A volume of gas is extracted from the main pressurized cylinder. The line is purged to eliminate contamination and then a one litre Tedlar bag with a teflon lined septa is filled. Each Tedlar bag is used only once.

Aliquots from the Tedlar bags are withdrawn using Hamilton gas tight glass syringes. The volumes of each standard (as indicated with concentrations on the included calibration standard concentration sheets) are then injected into 30 ml precapped, pre-cleaned (EPA protocol B Level II) evacuated glass vials. Each standard has its owned designated syringe which is cleaned daily with ultra-pure nitrogen before the standards are prepared.

7.0 Analytical Procedures

7.1 Quantification Limits

The "Quantification Limit" is a concentration level at which the degree of confidence in the actual presence of a compound becomes statistically valid and meaningful. Properly stated, a quantification limit should not be confused with the concentration represented by the smallest detectable chromatogram peak area. The importance of quantification limits should also be weighed in the context of acceptable exposure levels and the general levels of contamination on a site. The quantification levels for compounds to be identified on the GC/FID (petroleum hydrocarbons) will range from .1 to 10 µg/l and for compounds identified on the GC/ECD (halocarbons) from .05 to 1 µg/l.

The following tables list the minimum concentrations (the quantification limits) of selected compounds reported using TARGET's soil gas analyses.

REPORTED QUANTIFICATION LIMITS (#g/I) **VOLATILE ORGANIC COMPOUNDS** 1.0 acetone benzene 1.0 ethylbenzene 1.0 carbon tetrachloride 0.05 1.0 methylene chloride methyl ethyl ketone 1.0 chlorobenzene 1.0 1,1,2,2-tetrachloroethane 0.05 1.0 tetrachioroethene chloroform 0.10 trichlorofluoromethane 0.05 1.0 toluene 1.1-dichloroethane 1.0 0.10 1,1,1-trichloroethane 1,1,2-trichloroethane 0.10 1,1-dichloroethane 1.0 trichloroethene 1.0 trans-1,2-dichloroethene 1.0 methyl-tert-butyl-ether 1.0 meta-¶-xylene 1.0 1.0 ortho-xylene

1.0

cis-1,2-dichloroethene

7.2 Run Log Data Entry Procedure

RUN PROCEDURE

The analysis order for the 1st day is as follows:

A standard FID analysis

FID STD#1 FID STD#2 FID STD#3 Nitrogen Blank

10 Actual Job Samples

1 Nitrogen Blank

Duplicate of 10th Sample Analyzed

10 Actual Job Samples

1 Nitrogen Blank

Duplicate of 20th Sample Analyzed

FID CHK STD

A standard ECD analysis would be as indicated above with ECD standards and an ECD Check Standard.

Dual Analysis (FID/ECD)

ECD STD#1 ECD STD#2

ECD STD#3

FID STD#1

FID STD#2

FID STD#3

Nitrogen Blank

10 Actual Job Samples

1 Nitrogen Blank

Duplicate of 10th Sample Analyzed

10 Actual Job Samples

1 Nitrogen Blank

Duplicate of 20th Sample Analyzed

ECD CHK STD FID CHK STD The analysis order for the 2nd, 3rd, 4th, and 5th days is as follows:

Dual Analysis (FID/ECD)

ECD CHK STD

FID CHK STD

Nitrogen Blank

10 Actual Job Samples

1 Nitrogen Blank

Duplicate of 10th Sample Analyzed

10 Actual Job Samples

Nitrogen Blank

Duplicate of 20th Sample Analyzed

ECD CHK STD FID CHK STD

2. The run log book should be kept current AT ALL TIMES. Entries should be as follows:

DATE

ATTENUATION

METHOD

JOB CODE

CR4A[Data File]

DATE:

Date run and initials of technician who ran job

ATTENUATION:

Attenuation of sample during run

METHOD:

Method of analysis performed

JOB CODE:

See following example

CR4A:

Up to six-digit job code used as the base file name followed by .C and the sequential set of

numbers.

Job Code Entry (example)

Standards are entered as:

FID 1---Standard #

FID 2 FID 3

Blank after standard:

B-1

Actual Samples:

MWDW-1

MWDW-10---Sample #

Job Code ---→ MWDW-20

Blanks after Samples are entered as follows:

MWDW-10 MWDW-20 B-10 MWDW B-20 MWDW Check Standards:

CHK STD-1

Duplicates:

R-10 MWDW----Job Code

Sample # ---→ R-20 MWDW

- 3. Any entry errors should be crossed out once, initialed by the person who made the mistake, dated, and explained as per usual GLP guidelines.
- 4. A copy of each run log should be placed with the raw data in the manilla folder at the conclusion of each run.
- 5. During a run, the calibration of the standards should be checked immediately if any analytes are not identified. Check raw data and either adjust retention times or broaden or narrow the bands so as to enable the analyte to be identified. If retention time shifts and standardized analytes fall outside of window, the pattern of the shifts will be examined. If the pattern is discernible and predictable, the time band or retention time in the ID table will be changed as necessary.
- 6. If analyte is identified but the areas of all three concentrations do not produce an acceptable linear regression, re-analyze and re-calibrate. Adjust either the minimum area slope or drift accordingly prior to recalibration. (See Linear Regression Check Sheets in Appendices V and VI)
- 7. During the analysis if needed the attenuation can be changed and if such a change is necessary it should be indicated in the run log book immediately. FID analysis is usually run at Attenuation 1 and ECD analysis is run at Attenuation 6.
- 8. At the conclusion of the run the Raw Data Sheet Information for Reprocessing should be completed. All chromatograms should be checked for septa bleed, ghost peaks, background noise and other spurious peaks. (See Appendix VII)
- 9. Indicate any attenuation changes needed, and if any analyte has exceeded the linear dynamic range of the electrometer indicated by an integration error. (See Quantitative Calculation Report Mark Sheet in Appendix XIII) If they are in error, the Sample Re-shoot Check List (See Appendix IX) should be completed and the samples will be re-analyzed later at a higher range.
- 10. Sign and complete all necessary forms used for analysis then submit all

data and forms to be reprocessed. The Tracking Sheet must be kept current at all times, signed, and dated after each entry. Indicate any problems or changes in any manner in the notes space provided on the Raw Data Sheet Information for Reprocessing form.

8.0 Data Reduction, Validation, and Reporting

CR42 RPT is a data conversion program in which the data files generated on the CR4A during the actual run are converted to a report table format on an IBM compatible PC. To initialize this procedure the data files of the CR4A are converted to MSDOS by an MS conversion program which transfers the data from the original data disk to a shuttle disk. Groups of these data files are then converted and combined by the CR42 TBL program. CR4A information is stored on a 3.5" data disk. The RPT 2 TBL is stored on a 5.25" floppy disk in tabular format.

Data for the standard calibration is then retrieved in DOS format. The information retrieved in DOS format is then printed out via Word Perfect. The subsequent data is reviewed to ensure all analytes are identified and their concentrations are within acceptable criteria. The data and chromatograms are then submitted to the report writing group.

The final data packet will consist of chromatograms and report sheets for all samples analyzed, including those for initial calibrations, check standards, laboratory blanks, field samples, field blanks and sample duplicates.

9.0 Internal QC Checks

9.1 GC/FID and GC/ECD Analysis

See Section 6.1 for calibration and check standards.

10.0 Audits

The performance audit consists of laboratory blanks (every 10 samples), duplicate analysis of every tenth sample, check standards (at the beginning and the end of every job after the initial calibration), and field blanks (at the beginning and end of each day's sampling and after every 20 samples).

Data from quality control samples (laboratory blanks, field blanks, check standards), standards and soil gas samples, including soil gas sample duplicates, are reviewed by a mobile lab operator, by a project scientist in the report writing group, and by a QA assistant.

11.0 Preventive Maintenance

There is a maintenance book for each system. Maintenance is conducted on a daily basis and all information is recorded in the system maintenance book. Daily checks include: purge and flow rates, gas pressure readings to the GC, the FID is checked to ensure it is lit, and the HSS sufficient pressure warning light is checked. The columns are conditioned daily at 200°C; the ECD is baked off at 345°C. Injection septa are replaced on a daily basis.

The carrier gases are checked twice daily, on arrival in the morning and on departure in the evening. They are replaced when necessary or if there is a problem with the analysis on the GCs (e.g., if there is any baseline drift which is recurring and increasing in intensity, the carrier gas cylinder is replaced automatically and the supplier of the carrier gas is notified).

Other maintenance checks include: the replacement of columns as required based on loss of resolving capability or decrease in Retention Times (all other parameters constant) of more than five minutes.

All tubing is replaced when necessary. TARGET Environmental uses Supelco conditioned stainless steel premium grade 304 (1/8"OD x 2.1 mm ID).

12.0 SOP for Precision, Accuracy and Completeness

12.1 Precision

Precision will be determined by comparing the duplicate samples. Coefficient of variation (CV) will be used to estimate precision. The following equation will be used:

$$CV (\%) = (s/x) \times 100$$

where s = standard deviation of the analyte concentrations for the duplicate pair x = mean of the analyte concentrations for the duplicate pair

12.2 Accuracy

Accuracy means the nearness of a result to the true or expected value. Accuracy will be estimated in terms of average percent recovery (P) of standardized analytes in the check standards. The following equation will be used:

$$P(\%) = (Q/T) \times 100$$

where Q = analyte concentration measured in the check standard T = expected analyte concentration in the check standard

12.3 <u>Completeness</u>

All data will be reviewed for validity. Completeness (C) will be estimated as follows:

C (%) = (valid data obtained/total data needed) x 100

13.0 Corrective Action

13.1 Analytical Phase

For GC/FiD or GC/ECD analyses corrective action, see Section 5.

14.0 APPENDICES

APPENDIX I

CALIBRATIONS STANDARD CONCENTRATIONS

FID

Volume of the injection of stock standard into 30ml vial

Compound Name	STD#1 130#L	STD#2 232µL	STD#3 680µL	CHKSTD 232 _F L
ACETONE	1-12	2-01	€ 5-9	2.01
METHYL-TERT-BUTYL ETHER (MTBE)	2-49	4-45	13-0	4-45
METHYL ETHYL KETONE (MEK)	1-46	2-59	7.6	2-59
BENZENE	1-50	2-67	7-8	2.67
TOLUENE	1-78	3-18	9-3	3-18
CHLOROBENZENE	2-22	3-96	11.6	3-96
ETHYLBENZENE	2-12	3-78	11-1	3-78
META-& PARA-XYLENE (M&P-XYLENE)	4-24	7-56	22.2	7.56
ORTHO-XYLENE (O-XYLENE)	2-13	3-81	11-1	3-81

APPENDIX II

CALIBRATION STANDARD CONCENTRATIONS

ECD

Volume of the injection of stock standard in to 30 ml vial

Compound Name	STD#1 1000μL	STD#2 2000μL	STOCK	CHKSTD 2000µL
TRICHLOROFLUOROMETHANE (TCFM)	0-16	0 - 32	4-78	0 - 32
1,1-DICHLOROETHYLENE (1,1-DCE)	0 -40	0 - 79	11 -86	0 - 79
METHYLENE CHLORIDE (CH,CL,)	0 - 26	0 - 52	7 - 74	0.52
trans-1,2-DICHLOROETHYLENE (t-1,2-DCE)	0 -46	0 - 92	13 - 76	0 -92
1,1-DICHLOROETHANE (1,1-DCA)	0 -47	0 - 93	14-01	0 - 93
cis-1,2-DICHLOROETHYLENE (c-1,2-DCE)	0 - 59	1-18	17 - 70	1 - 18
CHLOROFORM	0.05	0-10	1 - 44	0-10
1,1,1-TRICHLOROETHANE (1,1,1-TCA)	0 - 05	0 - 09	1 -38	0 - 09
CARBON TETRACHLORIDE (CARBON TETT)	0 - 23	0 -45	6 - 80	0 - 45
TRICHLOROETHYLENE (TCE)	0 - 04	0 - 09	1 · 34	0.09
1,1,2-TRICHLOROETHANE (1,1,2-TCA)	0.08	0-16	2 - 40	0 · 16
TETRACHLOROETHYLENE (PCE)	0 - 06	0 - 12	1 - 73	0-12
1,1,2,2-TETRACHLOROETHANE (TECA)	0 - 05	0 - 09	1 • 36	0 - 09

APPENDIX III

CALIBRATION CHECK CHART

CD ILCIINCLAIN.	AB	TECHNIC	IAN:
-----------------	----	---------	------

JOB CODE:

CR4A: .C

C.

ATE:

SYSTEM:

DATE INJECTED:

FID	STA	NDARI) ARE	A'S	ECD	STAN	DARD	AREA'S	3
GASES	1	2	3	c-s	GASES	1.	2	3	c·s
ACETONE					I_ TCFM				
TBE		,			2. · 1,1-DCE				
ŒK					3. CH ₂ CL ₂	····			
BENZENE					4. T-1,2-DCE		-		
OLUENE					5. 1,1-DCA				
HIBENZENE					6. C-1,2-DCE			-	
THYLBEN					7- CHLOROFORM			·	
&P-XYLENE			···		8. 1,1,1-TCA				
-XYLENE					9. CARBON TEIT				
IF FACTO RESULTS		SITIVE	(check)):	10. TCE 11. 1,1,2-TCA 12. PCE 13. TECA				

IF FACTOR (1)
RESULTS ARE POSITIVE (check):____

APPENDIX IV

STP CONVERSION FACTORS

COMPOUND	<u> </u>	•,
MTBE BENZENE TOLUENE ETHYLBENZENE XYLENE DICHLOROETHENE DICHLOROETHENE TRICHLOROETHENE TRICHLOROETHENE TETRACHLOROETHENE TETRACHLOROETHANE METHYLENE CHLORIDE CHLOROFORM CARBON TETRACHLORIDE	254.1 286.8 243.1 211.0 211.0 231.1 226.4 170.5 167.9 135.1 133.5 457.1 350.0 280.0	f x μ g/L = PPB (V/V) f = $\frac{(22.4)}{MW}$

CONVERSION FROM PPB TO µg/L

The conversion from PPB to $\mu g/l$ is accomplished by using the following equation.

$$F = (22.4) (1000)/molecular weight$$

$$PPB/F = \mu g/1$$

The molecular weight is that of the individual compound for which the conversion is being made.

Dilutions are prepared at three concentrations. The first concentration is at or near the detection limit of the compound which has the smallest concentration in the stock standard. The second dilution is a middle range concentration. The third dilution concentration is near the off-scale concentration of the compound with the greatest peak area in the stock standard.

The concentration of the dilutions are calculated using the following equation.

concentration of dilute standard =

stock concentration (μ g/l) x <u>injection (μ l) x 10⁵</u> volume of sample vial (.03)L

APPENDIX V

FID LINEAR REGRESSION CHECK

NAME	CONC	AREA	LINEAR REGRESSION
ACETONE	1-12 -2-01 5-9		
MTBE (Methyl-Tert-Butyl-Ether)	2-49 4-45 13		
MEK (Methyl Ethyl Ketone)	1-46 2-59 7-6		-
BENZENE	1-50 2-67 7-8	-	
TOLUENE	1.78 3-18 9-3		
CHLOROBEN(Chlorobenzene)	2-22 3-96 11-6		
ETHYLBEN (Ethylbenzene)	2-12 3-78 11-1		
M&P-XYLENE (Meta-&Para-Xylene)	4·24 7-56 22·2	****	**************************************
O-XYLENE (Ortho-Xylene)	2·13 3·81 11·1		

TECHNICIA	N:
	TECHNICIA

APPENDIX VI

ECD LINEAR REGRESSION CHECK

NAME	CONC	AREA	UNEAR REGRES	SION
TCFM	0-16	=======	========	
(Trichoroflouromethane)	0.32			
	4.78			•
11 DCE				
(1,1-Dichloroethylene)	0-40 0-79	* .		
(1,1-clanoroentylette)	11-86			
			*	
CH2CL2	0-26	•		
(Methylene Chloride)	0-52			
	7-74		<u> </u>	
112 DCE	0-45			
(trans-1,2-Dichloroethylene)				
(13-76		•	

11 DCA	0-47	•		
(1,1-Dichloroethane)	0-93		,	
	14-01		-	
C12 DCE	0-59		•	•
(cis-1,2-Dichloroethylene)	1-18			
	17-70			
OU COCCODA		•		
CHLOROFORM	0-05			
	0-10 1-44	•		
111 TCA	0-05			
(1,1,1-Trichloroethane)	0.09			
	1.38		•	
CARBON TETT	0.23			
(Carbon Tetrachloride)	0-45			
	6-80	•		
TCE	0-04			
(Trichloroethylene)	0-09		, ,	
	1-34		***************************************	
112 TCA	0-08			
(1,1,2-Trichloroethane)	0-16			
	2-40		•	
805				
PCE (Cataoble continuous)	0.06			
(Tetrachloroethylene)	0-12 1-73	•	_	
	1-10			-
TECA	0-05			
	0-09			
	1-36		•	
JOB CODE:	mare.		TECHNICIAN:	
404 COUE:	UA161_		I COLIMICIAIN;	

APPENDIX VII

Circle Applicable:	FID	ECD	вотн	
RAW DATA	SHEET INFORM	IATION FOR R	EPROCESSING	<u>.</u>
•		. '		
DATE ANALYZED:		*CALIBRAT	пои ок	:
SYSTEM #:		*RE-CALIB	RATED BEFORE RUN	:
· .				
JOB CODE:	*	*RE-CALIBRATED	AFTER RUN:	
CR4A: .C		.C		
INITIALS OF PERS	ON WHO RAN JOB:			
MINIMUM AREA:		RANGE:		
ATTENUATION	ERROR ON GAS	ATTENUATION	ERROR ON GAS	
. <i>•</i>				
			•	
	•			
NOTES: (Attenuation	on changes during run, e	etc.)	:	
TECHNICIAN:		DATE:		

APPENDIX VIII

Quantitative Calculation Report Marks

The marks written in the MK column of the quantitative calculation report indicate the peak processing (chromatogram) states, and include:

No mark: Independent peak or the first incompletely separated peak

S: Main peak with tailing

V: Second or subsequent incompletely separated oeak

T: Tailing-processed peak

TV: Second or subsequent incompletely separated peak on a tailing

L: Leading-processed peak

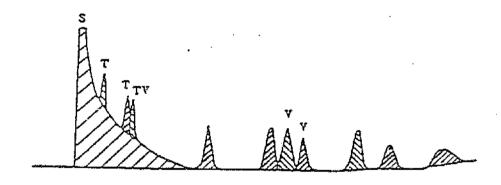
LV: Second or subsequent incompletely separated peak on a leading

E: Error peak (at an input voltage of below - 5mV or above IV)

H: Horizontal baseline-processed peak

R: Internal standard peak or reference peak in the relative retention time method

EX.)



Peak Processing Marks

APPENDIX IX

SAMPLE RE-SHOOT CHECK LIST

OB CODE	SAMPLE #	RAN ON SYSTEM #	DATE RUN	FID/ECD	TO BE RUN @ RANGE
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				•	
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ECHNICIAN:	DATE:

APPENDIX - 4

A. L. B.'s Field Procedure and Methodology

FIELD PROCEDURES AND MEASUREMENTS

1.0 Drilling and Soil Sampling Procedures

The drilling and sampling procedures outlined in this document describes the typical and standard procedures used in the collection of representative soil samples for the evaluation of the subsurface materials and the prevailing site conditions of the area under investigation.

1.1 Drilling Method, Equipment and Procedure

The most frequently used and most accepted drilling method is the hallow-stem auger boring. This method is very effective for drilling unconsolidated materials up to a maximum depth of 200 feet.

The equipment used for hallow-stem auger drilling includes either a mechanically or hydraulically-powered drilling rig which are usually truck-mounted to permit easy and rapid mobilization and demobilization.

Dry drilling methods are employed at most locations for soil borings. The rig simultaneously rotates and advances the hollow-stem auger columns. These columns serve not only as casings to prevent "cave-in" or collapse of bore walls but also as medium to carry soil cuttings towards the surface thru the auger flights.

1.1.1 Equipment Preparation and Decontamination

Prior to every drilling and sampling operations, all drilling and sampling equipment and accessories are decontaminated by steam cleaning or by scrubbing by hand with trisodium phosphate (TSP) in distilled water, rinsed with tap water, rinsed with deionized water and air dried.

To prevent cross-contamination between soil samples obtained at different depths and at different borings, additional decontamination procedures for the sampling equipment are performed after every sampling run and for the drilling accessories upon completion of every hole. All steam cleaning condensate and wash water is contained pending proper transport and disposed of at an approved disposal site.

1.1.2 Auger Boring (For Shallow and Deep Borings)

Shallow soil borings are drilled using a smaller model truck-mounted hallow-stem augers. Soil samples are generally collected at 5-foot intervals using a spilt-spoon sampler with a hydraulic piston hammer. For deep soil borings, bigger rigs are usually used such as B-53 or bigger, depending on the target depth of the borehole. Soil samples are, likewise, collected using a split-spoon sampler driven ahead of the auger bit at the desired sampling depth. With the bigger rigs, sampling is usually done using the standard 140-pound drive hammer.

1.1.3 Abandonment of Borehole

Upon completion of drilling and soil sampling, the borehole is backgrouted to the surface with cement grout. To abandon, the borehole is grouted with Volciay Grout by pumping the grout slurry into the hole. The borehole is filled from the bottom to about a foot below the ground surface. After the grout fill has hardened, the one-foot space is filled up with Ready Mix Concrete.

1.1.4 Drill Cuttings Disposal

Drill cuttings are usually stockpiled or stored in a suitable container such as sealed drums or wrapped in a 4 mil polyethylene plastic sheets. The cuttings are disposed of accordingly depending on the analytical tests results conducted. If concentrations are below hazardous levels, the drill cuttings will be removed to a pre-arranged receptor. If concentrations are above hazardous levels, the cuttings will be removed to a certified Class 1 facility.

1.2 Soil Sampling Procedure

In conjunction with the drilling, Standard Penetration Test (SPT) or drive sampling is generally undertaken at 5-foot intervals. Soil samples are taken at the desired depth using split-spoon drive sampler either thru hydraulic piston hammer or the standard 140-pound drop hammer. Portions of the collected soil samples are used for lithologic loggings while the relatively undisturbed ones are sent to analytical laboratories for analyses.

1.2.1 Decontamination of Sampling Devices

Prior to the start of the sampling operations and after completion of every sampling round, the sampling devices such as the split-spoon sampler and the Shelby tubes (brass rings) are decontaminated by scrubbing them by hand with trisodium phosphate in distilled water and then rinsed with tap water, rinsed three times with deionized water and air-dried prior to the sampler's reassembly.

1.2.2 Split-Spoon Sampling and SPT Measurements

The split-spoon sampler is lined with three 6-inch shelby tubes (brass cylinders) with a diameter that ranges from 1-1/4 inches for shallow holes to 3 inches for deeper holes. The sampler is lowered into the borehole, either on a wire line or at the end of the drill pipe, and driven 18 inches into the subsoils with the use of the standard 140-pound drop hammer or with the hydraulic piston hammer respectively. The number of blows (NB) to effect every 6 inches penetration for the entire 18 inches of sampling, using the 140-pound drop hammer, are recorded. SPT is terminated after penetrating 18 inches into the subsoils or after registering 50 blows without effecting a 6-inch penetration. After the sampler is pulled out, the drilling is resumed for the next drilling interval. The sequence of drilling and SPT is repeated until the target sampling depth for the borehole is reached.

1.2.3 Sample Collection

Upon retrieval of the split-spoon sampler from the borehole, the sampler is split longitudinally. The middle portion cylinder is saved for laboratory analyses. It is trimmed at both ends of any protruding materials. The ends are then covered by teflon sheeting and sealed with tight fitting plastic end caps. The end caps are further sealed to the brass tube with the use of an electrical or other appropriate adhesive tapes. The sample is properly labeled as to sample and boring number, depth and date collected. The sample is then placed in a Ziploc plastic bag and stored in a cooler containing ice.

The lower most end cylinder (near the drive shoe) is either archived for future reference or examined by the field geologist for lithological logging. The upper most end is normally discarded and/or examined by the field geologist in case the lower most end sample is kept as duplicate sample.

Prior to lithological logging, the drive samples are monitored for off gassing of volatile organic compounds using organic vapor analyzer (OVA) or any other equivalent monitoring devices.

1.3 Lithologic Logging

Both the drill cuttings and the drive samples are examined by the field geologist as they are collected. The soil materials are described in accordance with the ASTM Unified Soil Classification System (USCS), as to the soil type, grain size, color, presence of fines, relative densities and descriptions and characteristics which may infer presence of contaminations such as discoloration and odor. All these features including the location of the borehole, the name of the contractor, drilling method and equipment used, SPT measurements, TLV readings, sample number and other information pertaining to these soil investigation are incorporated in the boring logs for each of the borehole.

2.0 Sample Handling and Custody

Protocols for handling samples which include sample preparation, labeling, preservation and chain-of-custody documentation are strictly observed from the moment of its collection through analysis and reporting of analytical values.

2.1 Sample Documentation

Immediately after sample collection, the sample container is properly labeled indicating sample identification number, borehole number depth sample taken and date collected. Sample lithologic descriptions, measurements and other relevant information regarding the on-going soil investigation are indicated in the corresponding borehole log.

2.2 Sample Preservation

For sample preservation purposes while in the field, the sample containers are placed in a Ziploc plastic bag and stored in an ice chest with ice to keep the samples cooled at approximately 2° to 4°C until delivered to a DHS certified analytical laboratories where samples are stored in cold storage units.

2.3 Chain-of-Custody Transfer

The collected samples are either shipped by express courier or hand delivered to the analytical laboratories for analyses within 48 hours of sampling.

All samples submitted to laboratory for chemical analyses are accompanied by chain-of-custody record. The record includes information such as sample identification number, sampling date and time, sample location, type of analysis required, special instructions for the laboratory. This record or form is checked for accuracy and completeness, and then signed and dated by the laboratory sample custodian accepting the sample.

APPENDIX - 5

Boring Logs

B U RKE NGI N 5 WE S LAMBERT Т R D. SUITE

BRE CAL IFOR NIA SHEET 1 OF 2 CLIENT: BURBANK AIRPORT AUTHORITY LOCATION OF BORING: JOB NO. BORING NO. 90~06 PROJECT NAME: NEW SERVICE ROAD AREA - BURBANK AIRPORT CSB-1 Confirmatory Soil Boring and Sampling DRILLING METHOD: LOCATION SKETCH CONCRETE PAD WASH DOWN AREAS Hollow Stem Auger - 8" LOCKHEED PROPERTY LINE-DRILL RIG TYPE: CME-75 SAMPLING METHOD: -cse-3 Split Spoon Sampler (2 1/2" x 18") ۹ SAMPLE STORAGE METHOD: Blue Ice and Cooler CS9~5 🚳 START FINISH WATER LEVEL NEW SERVICE ROAD 7:30 AM TIME 10:15 AM CHAIN LINK -FENCE (TYP) START DATE DN# DATE ELEVATION: DATUM: CASING DEPTH 11/14/91 11/14/91 SURFACE CONDITION: / READING (PPM) Asphalt-paved Surface BLOWS PER SIX INCHES E P DEPTH IN FEET GRAPHIC LOG 30E NOTED [SOIL DESCRIPTION 2 3" ASPHALT FINE TO COARSE, SILTY SANDS: DARK BROWN: STRONG HYDROCARBON CSB-1 3/3/4 80 (PETROLEUM) ODOR; POORLY GRADED; HIGHLY CONTAMINATED ZONE -2.5 ML. 1.5 TO 3.5 FT. CSB-1 5 9/11/15 CSB-t 10-33/25/30 10 GRAVELLY; FINE TO COARSE SANDS; GRAVISH BROWN; MAX. SIZE 1-1/2 INCHES; WELL GRADED; VERY DENSE; NO ODOR. CSB-1 15 9/15/18 20 14 PEBBLY; FINE TO COARSE SANOS; GRAYISH BROWN; LITTLE SILTS; WELL SW GRADED; VERY DENSE; ALLUVIAL DEPOSITS. CSB-1 20-28/50 20 19" GRAYELLY TO COBBLY; FINE TO GOARSE SANDS; GRAY; FINES LESS THAN 10% MAX. SIZE OF SUBROUNDED GRAVELS - 2 INCHES; WELL GRADED; VERY DENSE; ALLUVIUM. C58-1 25-13/24/30 CSB-1 29' 30-FINE TO COARSE SANDS; GRAY; UNIFORMLY GRADED; VERY DENSE MATERIALS. 23/31/40 25 SP CS8-1 34' CLAYEY SILT; BROWNISH GRAY; SLIGHTLY PLAST 13/19/25 35 ML 25 SP FINE SANDS: GRAY: UNIFORMLY GRADED: VERY DENS CSB-1 40 14/19/25 50 39, APMERO. WEST HAZMAT DRILLING CORP. #03376 DRILLING CONTRACTOR: LOGGED BY: DRILLER(S): D. MAROCCHI, B. PINKNEY, E. REID CHECKED BY R.C.E. DATE: _

SP1.DWG

A. R K G E AMBERT E ST R D. UITE 3 2 1 1

, CALIFORNIA 9 2 6 2 1 SHEET 2 OF 2 CLIENT: BURBANK AIRPORT AUTHORITY OCATION OF HORING JOB NO. BORING NO. 90-06 PROJECT NAME: BUNKER-SIMULATED GASOLINE FIRE AREA CSB-1 Confirmatory Soil Boring and Sampling LOCATION SKETCH CONCRETE PAD WASH DOWN AREAS DRILLING METHOD: Hollow Stem Auger - 8" LOCKHEED PROPERTY LINE -DRILL RIG TYPE: **CME-75** SAMPLING METHOD: -CSB-3 Split Spoon Sampler (2 1/2" x 18") **(A)** - DRAINS SAMPLE STORAGE METHOD: Blue Ice and Cooler CSB~5 CSB-1 START WATER LEVEL NEW SERVICE ROAD 7:30 AM TIME 10:15 AM CHAIN LINK --FENCE (TYP) START 뛗왩 DATE DATUM: ELEVATION: CASING DEPTH 11/14/91 11/14/91 SURFACE CONDITION: (PPM) Asphalt-paved Surface BLOWS PER SIX INCHES AT OF R FEET GRAPHIC LOG 38 NOTED SOIL DESCRIPTION Ż 40 SP GRAVELLY, FINE SANDS; MAX. SIZE 1/2 INCH; GRAVELS ONLY ABOUT 10% CSB-1 45 23/25/32 44 GENERALLY UNIFORMLY GRADED: LITTLE SILTS: NO OFFOR. C5B-1 49 50 32/50 18 GRAVELLY, FINE TO COARSE SANDS; GRAYISH BROWN; LITTLE FINES; MAX. SIZE 1-1/2 INCHES; ANGULAR TO SUBANGULAR GRANULES; VERY DENSE; WELL GRADED. CS8-1 PEBBLY, FINE TO COARSE SANDS; GRAYISH BROWN; MAX. SIZE 1/2 INCH: 55-50/50-2 SW 54 ANGULAR TO SUBROUNDED; WELL GRADED; VERY DENSE. PEBBLY, FINE TO COARSE SANDS; GRAYISH BROWN; MAX. SIZE 1/2 INCH; ANGULAR TO SUBROUNDED; WELL GRADED; VERY DENSE. CSB~1 59' 34/50 60 45 CSB--1 65 50 12 FINE TO COARSE SANDS; GRAY; UNIFORMLY GRADED; VERY DENSE. SP FINE SANDS; GRAY; VERY FEW SUBROUNDED GRAVELS (1/2 INCH MAX.); CSB~1 69' UNIFORMLY GRADED; DENSE MATERIALS. 70 19/25/40 18 FINE TO COARSE SANDS; GRAY; SOME ROCK CHIPS RECOVERED (2 INCHES): CSB-1 75 50 20 WELL GRADED; VERY DENSE. SW FINE TO COARSE SANDS; GRAY; SOME GRAVELS (1/2 INCH); LITTLE FINES; WELL GRADED; VERY DENSE; ALLUVIAL DEPOSITS. CSB~1 79' 80 50 10 DRILLING CONTRACTOR: ___WEST_HAZMAT_DRILLING_CORP. A. ALMERO, M.S. R.E.A. #03376 LOGGED BY:

DATE: _

CHECKED BY R.C.E.

D. MAROCCHI, B. PINKNEY, E. REID

DRILLER(S): _

L. BURKE ENGINEERS WEST LAMBERT RD., SUITE 2 1 1 BREA. CALIFORNIA 9 2 6 2 1 eurer

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OCATION	OF BORING:					JOB N	o. 90-06	CUI	NT. BUR	BANK A	IRPORT .	AUTHORITY B	ORING NO.		
NEW :	SERVICE ROAD	AREA	- BURE	BANK AIR	PORT	PROJE	PROJECT NAME: Confirmatory Soil Boring and Sampling CSB-2								
	SKETCH CO	HORETE P.	AD AREAS—A	. 1		DRILLI	IO METRICO			ger — 8				\dashv	
1	LOCKHEED PROPER	TY UNE-	7 /	$\setminus \mid \mid$		DRILL	DRILL RIG TYPE: CME-75								
1 -				a cs	8-3 - 084NS		SAMPLING METHOD: Split Spoon Sompler (2 1/2" x 18")								
η -	CSB-5				- ORAINS	SAMPL	AMPLE STORAGE METHOD: Blue ice and Cooler							1	
1		CS9-	₹⊕	CSB SB-4 FAC	⊷1 AA LUTRES	WA						START TIME	FINISH	-	
	NEW SERVICE ROAD	4	///	⊕ —	T.		TIME					12:25 PA	1		
			CI FE	HAIN LINK THCE (TYP))		DATE					START DATE	FINISH DATE	一	
ATUM:	·····	EU	EVATION	:		CA	SING DEPTH					11/14/91	1	- 1	
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	<u> </u>	-		ļ] 2° ASPHAL	T							
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							FINE TO CO	ARSE S	ANDS; G	RAYISH E	ROWN; U	NIFORMLY GRA	DED; VERY FEW		
				II	SP		PEBBLES;)	REDIUM	IU DENS	ויי אט טַּוָ	JUK; ALLI	JYIUM,			
CSB2 5'	13/17/18	9		5	, ,		FINE TO CO	ARSE S	ANDS: G	RAYISH B	ROWN: U	NIFORMLY GRA	DED; VERY FEW	ı	
			,	-			PEBBLES; N	IEDIUM	IQ DENS	E; NO DE	OOR: ALLU	JVIUM.			
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15	20/21/10				SP		FINE TO CO	JARSE S DRWLY (ANDS; G GRADED;	RAY; VEF DENSE.	RY FEW G	RAVEL-SIZED I	MATERIALS (LESS		
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CSB-2		 		25-	SW									ļ	
25'	23/30/41	2		20			PEBBLY, FIL	O OT 3	COARSE S	ANDS; G	RAY; MA	K. SIZE - 1/2	INCHES: GRANUL	£\$	
							MACOUAN	JULAN	10 308K	、少いれいたい	WELL GH	ADED AND CL	CUNA DANUS,		
CSB2				<u> </u>		1111									
30'	20/25/37	0		30-	ML		CLAYEY SIL	TS; BRC	OWNISH;	DENSE M.	ATERIALS.				
	,	<u> </u>		П			DD4.								
CSB-2 35'	50	48		35	SW		GRAVELLY, ANGULAR Y	FINE TO O SUBR	COARSE	, SANDS; WELL GI	GRAY; M RADED SA	IAX, SIZE — NDS.	CAN PLES SAFE		
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A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621

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LOCATIO	OF BORING:					JOB N	90-06 BURBANK AIRPORT AUTHORITY									
<u> </u>	BUNKER-SIMUL			FIRE	AREA		PROJECT NAME: Confirmatory Soil Boring and Sampling CSB-2									
LOCATIO		MORETE P	AREAS 7	\		1	nollow Stem Auger — 8									
	LOCKHEED PROPER	IT UNE-	7 /	\setminus		DRILL.	RIG TYPE: CME-75									
			`` ~		-CSB-3		ING METHOD: Split Spoon Sampler (2 1/2" x 18")									
N .	/ csa-5		\			SAMPL	TORAGE NETHOD: Blue Ice and Cooler									
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CSB-2	···			1	H											
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55'	. 50						GRAYELLY, FINE TO COARSE SANDS; GRAY; ANGULAR TO SUBROUNDED; MAX. 3/4 INCHES; LITTLE FINES; WELL GRADED; VERY DENSE.									
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C58-2 60'	50	0		60-			PEBBLY, FINE TO COARSE SANDS; GRAY; ANGULAR TO SUBROUNDED; MAX. 1/2 INCH; WELL GRADED, CLEAN SANDS.									
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							1 INCH; WELL GRADED, CLEAN SANDS.									
					Ш											
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ი ვი _ ა				_	Н											
C 58-2 75'	41/50'-0"	0		75-			COBBLY, SANDS; GRAY; ONE COBBLE — 3 INCHES; WELL GRADED MATERIALS; VERY DENSE.									
					Ħ		· · · · · · · · · · · · · · · · · · ·									
·-··········				,	Ш											
CSB-2 60'	48/50	0		80-			ę									
		<u></u>				1	hland									
DRILLING	CONTRACTOR:	WE	ST HAZ	TAMS	DRILLI	IG CORP	LOGGED BY: R. A. ALMERO, M.S. R.E.A. #03376									
DRILLER(s): <u>D. MA</u>	ROCCH	I <u>, B.</u> F	INKN	EY, E.	REID	DATE: CHECKED BY R.C.E.									

AB

A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621

SHEET 1 OF 2

<u> </u>													SHEET.	OF				
	OF BORING:						JOB N	9006	CUENT: E	URBANK	AIRPORT	AUTHORITY E	BORING N	Ю.				
NEW S	ERVICE ROAD	AREA	- BURB	ANK /	AIRE	PORT	1	PROJECT NAME: Confirmatory Soil Boring and Sampling CSB-3										
LOCATION	WA.	NORETE P. SH DOWN		. 1			L	DRILLING METHOD: Hollow Stern Auger — 8"										
	QCKHEED PROPER	17 DME-	7.1.	$\sum I_{i}$			L	DRILL RIG TYPE: CME-75										
Ţ, =			7	5	CS	B-3 -DRANS	L	SAMPLING METHOD: Split Spoon Sampler (2 1/2" x 18")										
h -	/ CS8−5	729-	عاملان	4 C	/ :SB-		SAMPL	PLE STORAGE METHOD: Blue Ice and Cooler WATER LEVEL START TIME							1			
١,	MEW SERVICE	e my	///c	~7		AA Lifes	W/	ITER LEVEL	R LEVEL START						1			
	ROAD		///	(AN LINI	к.—	Z		TIME				7:20 AM	9	9:00 AM				
. <u>.</u>				NOE (TY	(P)			DATE				START DATE		PINISH				
DATUM:		ELE	EVATION	:			CAS	SING DEPTH				11/15/9	91 11/15/91					
	Eκν	ဋ	. ₹					SURFACE CONDI	lion: Con	crete-po	ived (wa:	sh down con	crete p	ad)	1			
SAMPLE NUMBER	BLOWS PER SIX INCHES	V READING (PPM) TIME AT		Æ	Ē	SOIL. TYPE	န္က မ		· · · · · · · · · · · · · · · · · · ·	SOIL	DESCRI	DTION	<u> </u>	 	1			
SAN	\$≦ 03 3	> &	TIME AT NOTED DEPTH		Z	ฬ≿	GRAPHIC LOG		· · · · · · · · · · · · · · · · · · ·	301L	DESCRI	FILON		•	-			
	番の	У.Н)	ž					<u> </u>										
				0-	П		* . 4	CONCRETE - 2 TO 3 INCHES THICK										
CSB-3						SP		FINE TO MEDI	IUM SANDS;	BROWNIS	H; VERY F	EW COARSE GR	(ANULES:	UNIFORMLY				
1'	13/15/17	0			F			GRADED; NO ODOR: LOOSE TO MEDIUM DENSE.										
CSB-3 5'	14/19/27	12		5				GRAVELLY; F	NE TO COA	RSE SAND	S; GRAYIS	H BROWN; MAX	K. SIZE O	FCRAVEL				
3			·····			-		AND CLEAN	s; subang. Sands.	JLAR TO	SUBROUND	ED; LITTLE FINE	is; Well.	GRADED	1			
					Ш													
CSB-3	8/11/12	0		10~	Ш			CDANCIA C	NE TO CO.	DÉC CAMP	6 CB 4 74 C	u mpassa aras	v elar o	ייי אור מייי				
10'	0711712	<u> </u>			GRAVELLY: FINE TO COARSE SANDS: GRAYISH 1-1/4 INCHES: SUBANGULAR TO SUBROUNDED AND CLEAN SANDS.								K, SIZE O ES; WELL	GRADED				
					П			AND CLEAN	SANUS.						l			
ÇSB-3	12/22/27	2	-	15-	Ш			ACAME IN T	WE TO CO.	555 5445					İ			
15'	12/22/21							SIZE 1 INCH;	LITTLE SILT	rse sand (s (10%);	s; Grayis Well Gra	H BROWN; SUE DED; MEDIUM T	IROUNDEL TO DENSE	D: MAX.				
			j		П			MATERIALS.										
CSB-3 20'	40 /30 /30	_		20-	Ш			5415 TO 004										
20'	19/30/39	5		~~				GRAVELS: PO	rse sands; ЮRLY GRAD	: BROWNIS ED.	H; MUCH	SILTS AND CLA	YS; VER	YFEW				
					Щ	ŀ												
CSB-3	20 /05 /05	 		25-	Н													
CSB-3 25	20/29/48	4		20-				FINE TO COA	rse sands;	BROWNIS	H; UTTLE	SILTS; UNIFOR	MLY GRA	DED SANDS.				
		{			Щ													
CSB-3				70	H													
30'	20/27/38	0		30		SP		FINE TO COA	RSE SANDS;	BROWNIS	H: LITTLE	SILTS; UNIFOR	MLY GRAS	DED SANDS.				
					Ш	Į.												
CSB-3					\mathbb{H}].												
35'	12/19/25	2		35⊶		ļ:		FINE SANDS;	BROWNISH;	SILTY AN	D CLAYEY	; UNIFORMLY	A SOPPOF	ESSION	<i>,</i>			
-,				:		Į.						1/2	XEE	HAZZ	{<			
	-				Ш					1				Exp .	仑			
CSB3 40'	14/20/32	0		40		į		FINE SANDS:	BROWNISH;	SILTY	D CLAYEY	UNIFORME	PADED.	75-43	1			
ORILLING (CONTRACTOR:	WE	ST HA	ZMAT	DF	RILLING	CORP	LOGGED	BY	R. A. /	LMERO,	M.S. REA	#03376	38200	1			
RILLER(S			II, B. F					DATE:			D BY R.C.	F 78 - W	11.0	eviha-	1			
· · · · · · · · · · · · · · · · · · ·	·	- -					7.00			VACON			7		/لپ			
												11/6	33 Ju Ca	Votes et	at,			

A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621

SHEET 2 OF 2

LOCATION	OF BORING:		· · · · · · · · · · · · · · · · · · ·	<u></u>		JOB N	o. 90-06	CUE	NT: SPINE	DEANY (AIDOND?	MITHODITY	BORING	NO.		
eu	NKER-SIMUL	ATED G	ASOLINE	FIRE	AREA	PROJE	PROJECT NAME: Confirmatory Soil Boring and Sampling CSB-3									
LOCATION :	SKETCH CO	ICRETE P	AD	ı	,,,,,,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	DRILLIN	(A L)FT (A)			ger		oampiing	<u> </u>			
ł ro	WAS CICHEED PROPER	LL FINE — PH DOMY	7 7	\ [DRILL	PIC TYPE	ME-75	. COURT PAUL	A 4:		<u></u>		······································		
│	4	+ +	(<u> </u>	+	cse-3 ***	SAMPL	ING METHOD:			· · · · · · · · · · · · · · · · · · ·	(0.4.)	AT 4 AT 1				
N =		-,/		•	DRAINS	1 .	E STORAGE ME	HIAM.			 .	2" × 18")				
	/ CSB-5 🗐	csą-	} ⊕ _#	-	S8-1				Blue Ic	e and	Cooler	1 etzet	····	FRUELI		
' Z	, — New Bervic Road	Ε	///6	52 -4	FACILITIES	WA	TER LEVEL			ļ		START TIME		FINISH TIME		
	попр		, , ,	HAIR UNI	<u>ڈ</u> ے,		TIME					7:20 A	yl .	9:00 AM		
					P)		DATE					START DATE		FINISH		
DATUM:		EU	EVATION	;		CAS	ING DEPTH					11/15/1	91	11/15/91		
	or un	ပ	프				SURFACE CON	:MOITIC	Concre	ete-pav	ed (wa	sh down co	ncrete	pad)		
ÄÜ	BLOWS PER SIX INCHES	V READING (PPM)	TIME AT NOTED DEPTH	Ę	ا بورا ب	Ξ,,	Concrete—paved (wash down a									
SAMPLE	SWS :	馬覧	₩2	DEPTH	SOIL SOIL	GRAPHIC LOG										
wz.	20.2	٦	, O	Ι.		Ğ		,	,							
· · · · · ·					+											
				40-	11											
					H											
							•									
CSB-3 45'	12/32/42	2		45-			FINE TO COA	ARSE SAI	NDS; GR	AYISH; (GRAIN SI	ZE - 1/2 INC	H; ŞUBA	ANGULAR		
							to Subroun Very Dense	NDED; LIT	TLE FIN	ES (LES	S THAN	10%); WELL GF	RADED	DENSE TO		
					H [
CSB-3	32/50	0		50-			EINE TO CO	FINE TO COARSE SANDS; GRAY; MAX. SIZE 1-1/2 INCHES; SUBANGULAR T								
50'	32/30		·····	- "			SUBROUNDED	o; utile	SILTS;	WELL GE	RADED;	VERY DENSE M	SUBAN IATERIAL	igular iu .S.		
				1												
OPD_3				_ ·	∐ sw l											
CSB3 55'	50	٥		55	3"		FINE TO COA	ARSE SAI	NDS; GR	AY; MAX	C SIZE 1	-1/2 INCHES;	SUBAN	IGULAR TO		
					1 1		SUBROUNDED; LITTLE SILTS; WELL GRADED; VERY DENSE MATERIALS.									
			· · · · · · · · · · · · · · ·		# !											
C58-3	40/50	2		60-			FINE TO COA	ARSE SAI	NDS; GR	AY; SUB	IROUNDE	D GRAVELS; M	AX. SIZ	E 1 INCH;		
	 				#		FINES LESS	THAN 10	X; WELL	. GRADEI	O AND V	ERY DENSE.				
					╫╶┞	:::::										
CSB-3	40/50	O		65-			FINE TO COA	1000 CA1	ine en	AV. ent	IDOI INDE	D GRAVELS; M	IAV PLT	E 1 BLOCK		
65'	70/00						FINES LESS	THAN 10	7; WELL	. GRADE!	D AND V	ERY DENSE.	ima. DIZ	e invat;		
					Į ļ											
C58-3				_,	╂											
70	25/30/36	2		70-			AN 41 MILE M									
					T ML		CLAYEY SILT	; SLIGHT	LY PLAS	STIC, DEN	VSE MAT	ERIALS.				
	<u> </u>				\prod											
CSB-3 75	50	-	·	75	<u> </u>		SILTY FINE S	ANDS: F	EW COR	BLE-SIZ	ED PIFC	es recovered	i buub	Y GRADED		
	<u> </u>				SP [++		IEVI					
					 		CORRIY TO	BOHI DEB	Y LAYE	3 をかしい:	NTTOSN	AT 78 FEET.	CTD AMA			
CSB-3	80	_		80-	GP .		OF AUGERS.	NO SAM	PLE RE	OVERED	, EXCEP	T FOR FEW RO	CK PIE	CES (MAX.		
80'																
DRILLING C	ST HAZ	ZMAT	DRILLING	CORP	D 8Y:	F	R. A. AL	MERO,	M.S. R.E.A.	#033	76					
DRILLER(S):	D. MA	ROCCI	11, B. F	NKNI	Y, E. R	EID	DATE:			CHECKED	9 8Y R.C	E				
L		.,											10.43			

A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621 SI

SHEET 1 OF 2

LOCATION	OF BORING:	·	,			JOB N	0. 00 05	CLIE	NT: GUG	DANK	AIDOADT	AUTHORITY	BORING	NO.	
NEW !	SERVICE ROAD	AREA	- BURE	BANK A	MPORT	PROJE	90-06 CT NAME: C					Sampling		CSB-4	
LOCATION	SKETCH CO	ICRETE P	AD			DRILLIN	IC METHOD.		·		···	sampiing .			
ı	LOCKHEED PROPER	en domin	77	\		DRILL	DRILL RIG TYPE: CME-75								
·		• • • • •	(. <u> </u>	<u>.</u>	CSB-3	SAMPL	SAMPLING METHOD: Split Spoon Sampler (2 1/2" x 16")								
N =					DRAINS	SAMPL	SAMPLE STORAGE METHOD: Blue ice and Cooler								
	CSB-5	cse-	\$ @	- OI-	58-1	<u> </u>	······································	·····	Dine (C	e ana	Cooler	START	T	FINISH	
·	NEW SERVICE	Ε `	1//6	\$8∼4[<u>r</u>	AOUTIES	17.4	TER LEVEL		· · · · · · · · · · · · · · · · · · ·	<u> </u>		TIME		FINISH	
ı			Ģ	HAIN UNI		···	TIME	ļ	<u> </u>		ļ	10:30 A	3.84	12:00 AM	
DATUM:		EU	EVATION	•	•		DATE	.,.			<u> </u>	START		TANS!	
····				.		CAS	SNG DEPTH	DITION		<u> </u>	<u> </u>	11/14/9	"	11/14/91	
	E E	알	E E	l _,	_		DOIN AGE GOI	ipi (joit,		Aspholi	-paved				
SAMPLE	S S S	V READING (PPM)	E A		SOIL	GRAPHIC LOG	SOIL DESCRIPTION								
₹ 5	BLOWS PER SIX INCHES	7.	TIME AT Noted Depth	OPED OFF OPETH IN FEET SOIL TYPE			SOIL DESCRIPTION								
ļ	Що,	F	Z	<u> </u>			_								
CSB-4	24/25/20	8		0-	<u> </u>		2 INCHES	OF ASPH	ALT						
<u>'</u>		 ,					PEBBLY, FINE TO COARSE SANDS; GRAYISH BROWN; SUBANGULAR TO SUE ROUNDED; MAX. SIZE 1/2 INCH; LITTLE FINES (LESS THAN 10%); WELL								
							GRADED;	NO ODOR	ALLUVI	UM.	1 11 18	(11110.			
CS9-4	25/29/23	2		5-			GRAVELLY.	FINE TO	CDARSE	SANDS	- CRAY	20% GRAVEL	/1 /2 IN	ichi wei	
5	2-7,2-7,2-			-			GRADED;	DENSE MA	ATERIALS		, 01,711,	ZOW WINIEL	(1) # R1	1011), 1766h	
CSB-4	27 /20 /75		 : ·	10-			554)5114	DUE 70							
10'	23/29/35	1		'-	Ni i		GRAVELLY,	DENSE MA	ATERIALS	SANUS	GRAY;	20% GRAVEL	(1/2 IN	ICH); WELL	
CSB-4				ا ا	\mathbb{H}										
15	50	5		15-			PEBBLY, F GRANULES	INE TO C	OARSE S VZE 3/4	Bands; Inch; \	CRAY; SU MELL GRA	JBANGULAR TO DED: VERY DE) Subr Inse.	OUNDED	
		,						-	•	·					
					H										
CSB-4 20'	25/31/34	11		20			GRAVELLY,	FINE TO	COARSE	SANDS	GRAY;	LITTLE FINES;	SUBAN	IGULAR TO	
					SW		3001100111	ev, maa	H -MART 1.	1/ E 111	OTES, TH	ar Granding	YENT U	Histor.	
					#										
CSB-4 25'	50	9		25-								FINES LESS T	HAN 10	X; WELL	
			·				GRADED C	LEAN SA	NUS; VEI	KT DENS	DE.				
					#										
CSB-4 30'	38/40/44	12		30-			GRAVELLY,	FINE TO	COARSE	SANDS	GRAY;	FINES LESS T	HAN 10	O%; WELL	
~~							GRADED C	LEAN SA	NDS; VE	RY DENS	SE.				
					+										
CSB-4	25/24/50	18		35-			GRAVELLY	FINE TO	COARSE	SANDS	t CRAY-	LITTLE FLAGE	Marke	CRAVET	
35'		ļļ					SIZE 2 IN	CHES; GR	AVELS A	BOUT 2	OX: WELL	CRAPME AND	NOTE A	THE PARTY NAMED IN	
					\Box		\rightarrow 44€°						. E.	MACK	
CS8-4	05 (50		a.	40-	∄ ∣		GRAVELLY,	FINE TO	COARSE	SANDS	GRAY;	MIE AND	MAX.	DRAVEL 2	
40'	25/50	_ ا					DENSE.	unto; Gi		h/		CRADED AND	3-3	SANDS; =	
DRILLING	CONTRACTOR:	WE	ST HA	ZMAT	DRILLING	G CORP	LOGG	ED BY: _	F	A. A	LMÉRO,	R.E.A.	GOB	00,36	
	s): <u>D. MA</u>									OHECKE	D BY R.C	Muci	life	Haliant	
	, (n		······· 3· c··					· · · · · · · · · · · · · · · · · · ·				1100	√ 2 ± −		
							•						3/18	NAT TO SELEND	

A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621

SHEET 2 OF 2

LOCATION	OF BORING:	<u>-</u>	*****				JOB N	NO. 90-06 CLIENT: BURBANK AIRPORT AUTHORITY BORING NO.								
e	OUNKER-SIMUL	ATED G	ASOLINE	FIRE	ARE	A	PROJE	PROJECT NAME: Confirmatory Soil Boring and Sampling CSB-4								
LOCATION	SKETCH cor	HORETE PA	AD AREAS				DRILLI	ING METHOD: Hollow Stem Auger — 8"								
1	LOCKHEED PROPER		7/	\			DRILL	RIG TYPE: CME-75								
		··			-, C <u>58</u>	-	3	LING METHOD: Split Spoon Sampler (2 1/2" x 18")								
N -	/ css-5 €					DRAINS	SAMPL	LE STORAGE METHOD: Blue Ice and Cooler								
			\$ 100 m		CSB FAGLI		W	ATER LEVEL START FINISH								
	NEW SERVICE	Ε `	111	₩.		IIE3		TIME 10:30 AM 12:00 AM								
ĺ			1 11	HAIN LIN ENCE (T	₩ ٣)	3.	-	DATE START FINISH DATE OATE								
DATUM:	· · · · · · · · · · · · · · · · · · ·	ELE	VATION	:			CA	ASING DEPTH UATE UATE								
	<u> </u>		т					SURFACE CONDITION:								
was	ជ្ជភ្ជ	TLV READING (PPM)	TIME AT NOTED DEPTH		<u>.</u>		ပ္ထ	Asphalt-paved								
SAMPLE NUMBER	BLOWS PER SIX INCHES	₹ <u>₹</u>	¥ 8	1 5	N FEET	12	GRAPHIC LOG	SOIL DESCRIPTION								
છે.≩	90 X	200	L DN	"	z	Ì	쫎									
																
<u> </u>		l		40~	\prod			7								
			. <u> </u>		Ш											
	 	ļ		-	\mathbb{H}	SW										
CSB-4 45'	50	9		45-		ŀ		FINE TO COARSE SANDS; GRAY; SOME GRAVELS (MAX. SIZE 1/2 INCH); SUB-ANGULAR TO SUBROUNDED; LITTLE FINES; WELL GRADED; VERY DENSE.								
·					Ħ			ARGULAR TO SUBROUNDED; LITTLE FIRES; WELL GRAPED; WENT DENSE.								
					Ш											
CSB-4 50'	50	0		50-		-		FINE TO COARSE SANDS; GRAY; POORLY GRADED; VERY FEW GRAVELS; VERY								
								DENSE.								
					Ш			•]								
CSB-4 55'	36/50	5		55-		SP		FINE TO COARSE SANDS: GRAY; LITTLE FINES: UNIFORMLY GRADED; VERY								
						ŀ		DENSE MATERIALS.								
					Ш											
CSB-4 50'	34/50-5"	6		60-				FINE TO COARSE SANDS; GRAY: LITTLE FINES; UNIFORMLY GRADED; VERY								
80								DENSE MATERIALS.								
					#			.								
CSB-4	50	40		65-		ļ.		GRAVELLY, FINE TO COARSE SANDS; GRAY; FINES ABOUT 15% MAX. SIZE 1								
65'			· · · · · · · · · · · · · · · · · · ·			:	• • • • •	INCH: SUBANGULAR TO SUBROUNDED; WELL GRADED MATERIALS; VERY DENSE.								
					H	ļ:		<u>.</u>								
CSB-4	20/20/50	12		70-	Ш	!		CPANCILY ENE TO COADEC CANDO, CDAM ENDES ABOUT ARE USE OFFI								
70'	20/20/30	1.4		-		SW	***	GRAVELLY, FINE TO COARSE SANDS; GRAY; FINES ABOUT 15%; MAX. SIZE 1 INCH; SUBANGULAR TO SUBROUNDED; WELL GRADED MATERIALS; VERY DENSE.								
					Щ	ľ.										
CSB-4	50		•	75-	Ш	ŀ	• • • • • • • • • • • • • • • • • • • •	CODDLY, FINE TO COLORE DAINS COLV.								
75'	50	5		[,3_		ļ		COBBLY: FINE TO COARSE SANDS: GRAY: MAX. SIZE 2-1/2 INCHES: SUB-ROUNDED: WELL GRADED.								
			,		Ш	ŀ										
CSB-4					H		0 4 0	COBBLY TO BOULDERY LAYER ENCOUNTERED AT 79 FEET. CHATTERING OF								
80'	50			80		GW	•	AUGERS.								
DRILLING	CONTRACTOR:	WE	ST HA	ZMAT	DRI	LLING	CORF	P. LOGGED BY: A. ALMERO, M.S., R.E.A. #03376								
ORILLER(I, 8. f	INKN	ΙΕΥ,	E. R	EID	DATE: CHECKED BY R.C.E.								
<u> </u>								19/17/01 CSD4 NW								

AB

A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621 SHEET

SHEET 1 OF 2

LOCATION	OF BORING:	·······				JOB N	0	CLIE	NT: PLE					NG NO.									
NEW S	ERVICE ROAD	ARFA	_ AURE	ANK .	AIRPORT	L	PROFECT VAME																
LOCATION						i	Confirmatory Soil Boring and Sampling CSB-5 DRILLING METHOD: Hollow Stem Auger - 8"																
	WAS OCKHEED PROPERI	Crete P &H DÖYMN Cy Lishe-	#EAS 7				TOHON Stern Auger - O																
1 _			ff	7	· <u> </u>	l l	CME-/3																
N =				•	-CSB-3	,	Split Spoon Sumpler (2 1/2 x 1g)																
ή -	CS8-5	CSB-	مل و		/ SB-1	SAMPL	E STORAGE M	ETHOD:	Blue lo	e and	Cooler												
ı,	NEW SERVICE	\			FAA	W/	WATER LEVEL START TIME						FINISH TIME										
	ROAD		///	((a)			TIME							10:50 AM									
			ñ	HAIN LIN	ř e)		DATE					START FI		FINISH DATE									
DATUM:	······	EU	EVATION	•	·:·	CA:	SING DEPTH					1	5/91	11/15/91									
			=	Г	1	_ 	SURFACE COL	DITION:	<u> </u>	4 1 - 11				<u> </u>									
we:	BLOWS PER SIX INCHES	TLV READING (PPM)	TIME AT NOTED DEPTH	_	h	ပ္က	Asphalt-paved surface																
SAMPLE NUMBER	MS I	PNI)	E C	EP1H	SQI, TEE	_ <u>₹</u> δ	SOIL DESCRIPTION																
ã₹	E X	20	±01E	^	≊ " ~	8 -		·····															
		-	<u></u>	<u> </u>	<u> </u>		3 141041 1	MMc I a : **															
CS8-5	17/23/25	20		0-	₩	6 . P.1	3 INCH ASPHALT																
	-	-		1	SP/		FINE SANI		MISH; VE	RY FEW	GRAVELS	S; MUCH S	LTS; PC	DORLY GRADED;									
					SM																		
CS85	11/12/14	52		5			ENE TO C	OARSE S	ANDS C	BYNGR 1	BBUMN' I	LITTLE SILT	c. pres	21 V_5750									
5'	,,,,,,,,	٠			牌		GRANULES	3/4 INC	H; DENS	E MATER	BAL; ALL	UVIAL.	3; FC,00	DL 1-3;2EU									
		1			∏ sw																		
CS8-5	,				H "		į																
10	14/23/40	12		10-			FINE TO C	OARSE S	ANDS; G CH: DENS	RAYISH I	BROWN; I	LITTLE SILT LIVIAL	S; PEB	OLY-SIZED									
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CSB-5 15'	10/10/13	10		15-	sc		CLAYEY;	ROWNISH	; FINE S	ANDS W	TH SOME	GRAVELS;	MODER	ATELY PLASTIC;									
•							LOOSE MA	TERIALS.															
					 	K / / /																	
CS8-5	23/27/32	8		20-			FINE TO C	OARSE S	ANDS C	E A YICH.	SHANC	III AR TO S	S IBRALIN	IDED GRANULES									
20'	20,2,,02											GRADED;											
	1	-			П		1																
CSB-5				n=	Н	[::::::																	
25	35/33/40	20		25~			FINE TO C	OARSE S E 1/2 IN	ANDS; G CH); LITT	RAYISH; LE FINE!	SUBANG S: WELL	ULAR TO S GRADED; D	UBROUN ENSE M	(DED GRANULES IATERIALS.									
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CSB~5 30'	25/32/39	0		30-	∭ S₩					RAYISH;	GRAVELI.	Y, MAX. S	ZE 3/4	INCH; WELL									
			,		H		GRADED;	ULCAN SI	44D2														
					H		}																
CS8-5 35'	36/50	2		35~			FINE TO C	OARSE S	ANDS: G	RAYISH:	SUBANG	ULAR TO	HUROUN	DEBI MAX									
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CSB-5	1 /			40-	Н		FINE TO C	OARSE S	ANDS: G	RAYISH:	SUBANG		UBROUN	NDED: NAX									
40"	39/50	0		40-			SIZE 1 INC	H; FINES	LESS T	HAN, 103	K WELL	KARE B	ERY DE	NSE. 3-3-Q3 5									
DRILLING	CONTRACTOR:	WE	ST HA	ZMAT	DRILLIN	G CORF	`	ED BY:	-	Y 1/2	∨`	M.3. R.E											
DRILLER(S					IEY, E.	-		:		· · · · · · · · · · · · · · · · · · ·	BY R.C.	AUT /	in E	alini In									
~100001160	·/· — ····	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					OAIE	•		91120714L	01 N.O.	Mac											
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A. L. BURKE ENGINEERS 451 WEST LAMBERT RD., SUITE 211 BREA, CALIFORNIA 92621 SHE

SHEET 2 OF 2

LOCATIO	N OF BORING:					JOB N	0.	CLIENT				Ts	BORING N		
		LTED A	4001111	FIGE	4000		90-06 BURBANK AIRPORT AUTHORITY								
	BUNKER-SIMUL			. FIRE	ARLA		Confirmatory Soil Baring and Sampling Cost of Confirmatory Soil Baring and Compling Cost of Confirmatory Soil Baring Cost of								
LOCATIO		CRETE P	AD AREAS —7	. 1			10110	w Ster	n Aug	jer –	8"				
	LOCKHEED PROPER	IT LINE ***	7 /	$\backslash \perp$		DRILL	RIG TYPE: CME-	-75						-	
i 7					CSB-3		ING METHOD: Sp	2" x 18")	····	· · · · · · · · · · · · · · · · · · ·					
η	CS8-5		╮┕┺	7	DRAIN	SAMPL	E STORAGE METHO	-		ond (•				
		Ç29-	2		SB-1 FAA FACUTIES	W						START TIME	·	FINISH TIME	
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DATUM:		· · · · · · · · · · · · · · · · · · ·	VATION		· · · · · · · · · · · · · · · · · · ·	<u> </u>	DATE					START DATE		FINISH	
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ł	αχο	ပ္န	TIME AT NOTED DEPTH	l .			SORPACE CONDIN	ON	Ası	ohaltp	aved s	urfoce		:	
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CSB-5 45'	40/50	0		45-			FINE TO COARS	E SAND	S; CR/	YISH; C	RAVELL.	r; MAX. SIZE 1	INCH OF	\$U8-	
			·		∃ sw		ANGULAR TO SI DENSE.	OBKOON	DED G	KAVELD;	WELL G	RADED; CLEAN	SANDS;	VERY	
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CSB-5	40/50	٥		50-			FINE TO COARS	E SAND	S- CP/	MSH- O	SPAVELL	^ LEAY 517E 1	INCH OF	S110	
50'	77,00						ANGULAR TO SI	UBROUN	DED G	RAVELS;	WELL (RADED; CLEAN	SANDS;	VERY	
							DENSE.								
CSB-5					 										
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					H		7-111 2-411-2-111		•						
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CSB-5 60'	40/50	a		60-			FINE SANDS; G	RAYISH;	UNIFO	RMLY G	RADED;	VERY FEW GRA	NULES: V	ERY DENSE.	
					SP										
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CSB-5	77 /50			65-			EINE OANDO O	DAMON	f to brown	Marrier -	D48	()			
65'	33/50			"	2,50		FINE SANDS; G	KATISH;	UNIFC	TOMLY G	KADED:	VERY FEW GRA	MULES; \	ilry dense.	
000 5			-			o . o .									
CSB-5 70'	40/40/50	4		70-	SW		FINE TO COARS	E SAND	S; GR/	AYISH; A	AX. GR.	AVELS (1 INCH)	; WELL G	RADED;	
			· · · · · · · · · · · · · · · · · · ·			4	VERSI DENOE MA	MICKIAL	J.						
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CS8-5		[······	ایرا	H	•									
80'	50	_		80~		, ė				۱./					
DRILLING	CONTRACTOR:	WE	ST HA	ZMAT	DRILLIN	G CORF	LOGGED 1	BY:	R	A AL	MERO,	M.S. R.E.A.	#03376		
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APPENDIX - 6

QA/QC Program

QA/QC PROGRAM

1.0 Field QC Techniques

For all subsurface samples, and where the nature of other materials to be sampled permits, only discrete, undisturbed samples will be taken and prepared for analysis.

Duplicate samples will be taken in a ratio of 1:10 and evaluated for the same analytes as originals.

Where the nature of material to be sampled permits, and certifiably uncontaminated material can be obtained, field blank samples will also be submitted for analyses.

Field instruments will be calibrated using certified standards according to manufacturers' recommendations; preventive maintenance service will be performed by a manufacturer's authorized service center following the manufacturers recommended schedule at servicing.

2.0 <u>Laboratory Calibration Procedures</u>

The laboratory performing the analytical procedures will monitor the quality of all reagents and standard solutions used, and will document this monitoring program. The monitoring program will include screening of reagents for impurities.

Calibration of all analytical instruments used in the performance of the specified procedures will be performed in accordance with manufacturer's guidelines and EPA requirements. Specifically, GC/MS will be turned on a daily basis according to the specifications of the EPA CLP. The instrument will then be calibrated for all target compounds. Each ICP will be calibrated prior to running samples in accordance with EPA CLP protocols. Each AA unit will also be calibrated prior to running of samples. All samples will be spiked to determine whether matrix effects or other interferences are present. Other instruments used for specific procedures will be calibrated according to Manufacturer and EPA guidelines; and as necessitated by specific requirements of the analytical program.

3.0 Laboratory Analytical Procedures

All analyses will be conducted in accordance with relevant EPA requirements, including the current CPL protocols, 40 CFR 136, EPA-600/4-79-020 (1983), EPA-600/4-82-057 (1982), and SW-846.

Analytical procedures performed by EPA Methods 8010, 8020, and 8240, will meet EPA practical quantitation limits of 5 to 10 ug/kg. For EPA Method 8015 for non-halogenicted organics detection limit shall approach 24 ug/kg as required by the CRWQCB-LA. Where it is not possible to achieve these limits, due to matrix properties or required dilutions, these conditions will be noted and described.

4.0 Analytical Data Reduction and Validation

Analytical data will be reviewed inhouse by laboratory staff to ensure accuracy and completeness. Specific items to be verified include: that sample preparation and analysis information are correct and complete; that the appropriate procedures have been followed; that results are correct and complete; that QC samples are within established control limits; that blanks are within appropriate QC limits; that special preparation and analytical requirements have been met; and that documentation is complete.

5.0 Laboratory Inhouse QC Checking

Laboratory performance QC checks will include control samples, and method blanks, along with daily calibration data generation.

Matrix-specific QC procures will include the analysis to matrix spikes, and spike duplicates; monitoring recovery of surrogate compounds; monitoring results of standard additions if applicable; analysis of field blanks; and determination of method detection limits in specific matrices.